U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-283 959

Research, Demonstration, Training, and Fellowship Awards April-September FY 1977

U.S. Environmental Protection Agency, Washington, D C

Jun 78

United States
Environmental Protection
Agency

Grants Administration
Division (PM-216)
Washington DC 20460

EPA-GAD/1-78-02
April-September Fy1977

PB 283 959

EPA

Research, Demonstration, Training, and Fellowship Awards

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BIBLIOGRAPHIC DATA SHEET

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6.

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Grants Operations Branch

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9. Performing Organization Name and Address
Grants Administration Division
Office of Resources Management
Office of Planning & Management
Environmental Protection Agency

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. Sponsoring Organization Name and Address
Same as Item 9

13. Type of Report & Period Covered April - Sept FY 1977

14.

15. Supplementary Notes
This is an addition to the series of Awards Registers

16. Abstracts

This publication lists the grant awards offered by EPA during the period of April - September, Fiscal Year 1977, for research, demonstration, training, and fellowship programs.

A brief project description for most of the research and demonstration grants administered by Headquarters is contained in Section Two, arranged in ascending order of the Grant Identification Number. A Grant Number Index is included to assist cross-referencing into Section One material.

17. Key Words and Document Analysis. 17a. Descriptors

Water
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Air
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Hazardous Materials
Pesticides
Grants
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Water Supply
Training
Fellowships

17b. Identifiers/Open-Ended Terms
EPA Awards for research, demonstration, training, and Fellowship programs

17c. COSATI Field/Group

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INTRODUCTION

This publication provides information about the Environmental Protection Agency's (EPA) research, demonstration, training, and fellowship awards during the period April 1977 - September 1977. It is a companion publication to State and Local Grant Awards which lists awards to State and Local agencies.

The data is organized into two sections:

Section One - Georgraphic listing by State and program.

Section Two - Grant Number Index and brief project descriptions arranged in ascending order of the Grant Identification Number.

Project descriptions were, for the most part, prepared by the grantees and are provided only for those grants administered by the EPA Headquarters office. The inclusion of this information has proven to be very useful from a management aspect as well as in meeting and fulfilling requirements for providing information to the public.

The Grant Number Index is provided as an aid for cross-referencing information between the two sections. Locating a grant number in this index, the reader will find the name of the applicant and the State location. By referring to that State's listing(s) in Section One, information on that particular grant will be found.

This material was prepared by Lynn Szedon with the assistance of Sandra Artis and Donna Whitaker. We have made what we feel are a few improvements to this publication. The title, formerly the Awards Register, Volume I, has been changed, as well as the cover design. One of the major improvements is in the format and content of the project descriptions. Additional information, such as the starting and completion dates, amount of funds obligated, and the EPA Task Code has been included. The Smithsonian Science Information Exchange maintains a computerized file of project summaries for use by the general scientific community. We have, with the assistance of the Office of Research and Development, utilized this file for most of the project descriptions listed in Section Two.

Any comments or criticisms should be directed to Lynn Szedon, Grants Operations Branch (PM-216), Grants Administration Division, on (202) 755-3370.

SOURCES OF INFORMATION ON EPA GRANTS AWARDED, REPORTS GENERATED BY GRANTS AND OTHER GRANT-RELATED MATERIALS

Research, Demonstration, Training, and Fellowship Awards

Section I lists research, demonstration, training, and fellowship awards by State, program, and grantee name. Each record provides applicant name, municipality, program element, title, project director, grant identification number, type of grant award, date and dollar amount of award. Section II contains brief project descriptions for research and demonstration projects administered by Headquarters and is arranged in ascending order by the grant identification number. An index is provided for cross-referencing the information between Sections I and II.

1st Half of FY 1977 (October 1976 - March 1977)
EPA-GAD/1-78-01, NTIS Number PB278942, price $7.25

2nd Half of FY 1977 (April 1977 - September 1977)
EPA-GAD/1-78-02, NTIS Number and price to be assigned

State and Local Grant Awards

Lists all State and Local Assistance Awards by State, by program, and by grantee name. Format the same as for Research, Demonstration, Training, and Fellowship Awards listed above.

1st Half of FY 1977 (October 1976 - March 1977)
EPA-GAD/2-78-01, NTIS Number and price to be assigned

2nd Half of FY 1977 (April 1977 - September 1977)
EPA-GAD/2-78-02, NTIS Number and price to be assigned

AWARDS REGISTER, GRANTS ASSISTANCE PROGRAMS OF EPA

Volume I. Section I lists research, demonstration, training and fellowship awards by State, program, and grantee name. Each record provides applicant name, municipality, program element, title, project director, Grant Identification Number, type of grant award, date and dollar amount of award. Section II contains brief project descriptions for research and demonstration projects administered by Headquarters and is arranged in ascending order by the Grant Identification Number. An index is provided for cross-referencing the information between Sections I and II. Section III is a cross-walk for use in identifying the program/subprogram area of a grant in accordance with classifications of our Office of Research and Development.

1st Half of FY 1976 (July 1975 - December 1975)
EPA-GAD/1-76-001, NTIS Number PB252893, price $5.25

2nd Half of FY 1976 (January 1976 - June 1976)
EPA-GAD/1-76-003, NTIS Number PB260742, price $9.00

Transition Quarter of FY 1976 (July 1976 - September 1976)
EPA-GAD/1-76-005, NTIS Number PB275407/AS, price $8.00

1st Half of FY 1975 (July 1974 - December 1974)
EPA-GAD/1-75-001, NTIS Number PB241476, price $5.25

2nd Half of FY 1975 (January 1975 - June 1975)
EPA-GAD/1-75-003, NTIS Number PB245575, price $10.75,
Microfiche $3.00

Volume II. Lists all State and Local Assistance Awards by State, by program, and by grantee name. Contents and format the same as for Volume I, Section I.

1st Half of FY 1976 (July 1975 - December 1975)
EPA-GAD/1-76-002, NTIS Number PB253091, price $11.00

2nd Half of FY 1976 (January 1976 - June 1976)
EPA-GAD/1-76-004, NTIS Number PB261980, price $11.00

Transition Quarter of FY 1976 (July 1976 - September 1976)
EPA-GAD/1-76-006, NTIS Number PB275408/AS, price $9.00

AWARDS REGISTER, VOLUME II, CONTINUED

1st Half of FY 1975 (July 1974 - December 1974)
EPA-GAD/1-75-002, NTIS Number PB241400, price $9.00,
Microfiche, $3.00

2nd Half of FY 1975 (January 1975 - June 1975)
EPA-GAD/1-75-004, NTIS Number PB245576, price $11.75,
Microfiche, $3.00.

AWARDS REGISTER, GRANTS ASSISTANCE PROGRAMS OF EPA
Fiscal Year 1974 (July 1973 - June 1974)

Volume I.	Lists all awards in Fiscal Year 1974 except Waste Water Treatment Construction and Waste Water Treatment Reimbursement Awards. NTIS Number PB238370, price $8.00, microfiche, $3.00.
Volume II.	Lists only Waste Water Treatment Construction Awards in Fiscal Year 1974. NTIS Number PB238371, price $9.25, microfiche, $3.00.
Volume III.	Lists only Waste Water Treatment Reimbursement Awards in Fiscal Year 1974. NTIS Number PB238372, price $9.00, microfiche, $3.00.

AWARDS REGISTER, GRANTS ASSISTANCE PROGRAMS OF EPA
Fiscal Year 1973 (July 1972 - June 1973)

The format of this publication has the initial sort by State. Each entry includes grantee, identification number, program area, grant title, award date, and dollar amount. Environmental Protection Agency 220/1-73-004, NTIS Number PB229827, price $15.25, microfiche, $3.00.

The above publications can be purchased from:

National Technical Information Service (NTIS)
Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161
(703) 557-4650

AWARDS REGISTER, GRANTS ASSISTANCE PROGRAMS OF EPA
Fiscal Year 1972 (July 1971 - June 1972)

This publication is currently out of print. It is available for reference at all EPA libraries and at EPA Headquarters, Grants Administration Division, 401 M Street SW, Washington, D.C. 20460

MONTHLY LISTING OF AWARDS FOR CONSTRUCTION GRANTS FOR WASTEWATER TREATMENT WORKS

Awards for the wastewater treatment facilities construction grants under Public Law 92-500 made during a particular month are listed in a monthly publication entitled "Monthly Listing of Awards for Construction Grants for Wastewater Treatment Works." This publication is prepared by the Grants Administration Division and distributed and sold by the National Technical Information Service (NTIS).

The March 1974 issue (PB23130) provides a base listing of all grants awarded under Public Law 92-500. Beginning with the April 1974 issue (PB231300-01), the listings contain awards for one month only and are numbered in sequence. Microfiche (24X) of each copy is also available. The subscription price is $120.00 for 12 issues. Previous issues can be purchased at $10.50 per copy.

The publication is distributed to subscribers approximately six weeks after the close of the awards-listed month. It may be obtained through:

National Technical Information Service
Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161
(703) 557-4650

FEDERAL ASSISTANCE PROGRAMS OF THE ENVIRONMENTAL PROTECTION AGENCY

This publication includes descriptive information about Environmental Protection Agency assistance programs reprinted from the Catalog of Federal Domestic Assistance, which was prepared for the Office of Management and Budget. Similar information on programs of all Federal agencies is included in the Catalog which is available from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20420 for $18.00 and includes changes as issued. It is also available for public use in Federal Depository Libraries.

Copies of this publication may be obtained from the Environmental Protection Agency, Grants Operations Branch, Grants Administration Division (PM-216), Office of Planning and Management, Washington, D.C. 20460.

NOTE: All of the preceeding publications are available for examination at the Grants Administration Division and Library of EPA Headquarters and each Regional office.

OTHER GRANT-RELATED INFORMATION

A brief summary of a grant project is available on the majority of research and demonstration grants.

These summaries are available for projects that have received Federal funding. In rare instances, a grant application may contain privileged information and is so designated. For these, only the award data, such as grant number, applicant name, organization, location, grant title, amount awarded, and award date is available. Other information may be available depending on the particular circumstances.

The Smithsonian Science Information Exchange (SSIE), room 300, 1730 M Street, N.W., Washington, D.C. 20036, receives a copy of the summary of a grant and makes it available to the public on a fee basis. The cost of a print-out, if the Agency is identified and the grant or contract number is provided, costs $2.00 per grant number with a $10.00 minimum fee. A search on a subject (topic) is $60.00 per search service for 1 to 50 titles, and an additional charge of 25¢ per title. A search on the investigator's name can also be performed. All inquiries and requests for this service should be addressed to SSIE or phone (202) 381-4211.

REPORTS GENERATED BY GRANT SUPPORTED PROJECTS

Final reports and other program reports generated by grant supported projects are published and made available if merited. Final report information is available from the following program offices:

For solid waste management and resource recovery:

Publication and Distribution Unit
Office of Solid Waste Management
Environmental Protection Agency
Cincinnati, Ohio 45268

For air pollution control:

Library MD-35
Environmental Protection Agency
Research Triangle Park, North Carolina 27711

For pesticide publications:

Information Section WH-569
Office of Pesticide Programs
Environmental Protection Agency
401 M Street SW
Washington, D.C. 20460

For other research and demonstration projects:

Technology Transfer Staff
Office of Research and Development
Environmental Protection Agency
Cincinnati, Ohio 45268

EPA REPORTS BIBLIOGRAPHY QUARTERLY SUPPLEMENT

(sponsored by Library Systems Branch)

The EPA Cumulative Bibliography 1970-1976 published in December 1976 (NTIS Number PB265920, price quote obtained from NTIS) contains a bibliographic citation with abstracts for reports generated by EPA and its predecessor agencies and entered into the NTIS collection through 1976. Access points to this information are by Report Title, Subject (keyword), Corporate or Personal Author, Contract Number, and Accession/Report Number.

Beginning in March 1977, quarterly update supplements will be published listing and indexing EPA technical reports and journal articles entered into the NTIS collection during the preceding quarter. An additional index titled "Sponsoring EPA Office" is included as well. The fourth quarterly issue will cumulate and become the annual index for the year.

To order documents or subscriptions, contact the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161. Do not order from the U.S. Environmental Protection Agency. If what you have ordered is in stock on hand, you should receive your order within two weeks after it arrives at NTIS. If what you have ordered must be reproduced from a microform, or if all the paper copies have been sold and reprints are in process, you should receive your order within four to six weeks. Infrequently, orders may be further delayed by a contractor's inability to deliver to NTIS. You will be notified if such a delay is expected.

The EPA Reports Bibliography Quarterly Supplement series is available on annual subscription from NTIS at a cost of $45.00 for North American Continent users (single copies, when available, are $12.50 each). For those outside the North American Continent, please write NTIS for prices.

The following EPA Libraries maintain for reference purposes completed sets of EPA reports on microfiche.

Region I Library
Room 2211-B, JFK Federal Bldg.
Boston, Massachusetts 02203

National Marine Water Quality Lab
P. O. Box 277
West Kingston, Rhode Island 02892

Region II Library
26 Federal Plaza
New York, New York 10007

Region II Field Office Library
Edison, New Jersey 08817

Region III Library
Curtis Bldg., 6th & Walnut Streets
Philadelphia, Pennsylvania 19106

Headquarters Library, Room 2404 WSM
401 M Street, S.W.
Washington, D.C. 20460

Region IV Library
345 Courtland Street, N.E.
Atlanta, Georgia 30309

Library Services MD-35
Research Triangle Park
North Carolina 27711

Southeast Environmental Research Lab
College Station Road
Athens, Georgia 30601

Gulf Breeze Laboratory
Sabine Island, Bldg. 29
Gulf Breeze, Florida 32561

Region V Library
230 Dearborn Street, Rm. 1455-A
Chicago, Illinois 60604

Environmental Research Center Library
26 West St. Clair Street
Cincinnati, Ohio 45268

Environmental Research Lab-Duluth
6201 Congdon Boulevard
Duluth, Minnesota 55804

Region VI Library
First International Bldg.
1201 Elm Street
Dallas, Texas 75270

Robert S. Kerr Environmental Research
Laboratory
P. O. Box 1198
Ada, Oklahoma 74820

Region VII Library
1735 Baltimore Avenue, Room 249
Kansas City, Missouri 64108

Region VIII Library 8M-ASL
1860 Lincoln Street
Denver, Colorado 80225

National Field Investigation Center
Room A-1209, Blg. 53
Box 25227, Denver Federal Center
Denver, Colorado 80225

Region IX Library
100 California Street
San Francisco, California 94111

National Environmental Research Center
P. O. Box 15027
Las Vegas, Nevada 89114

Region X Library
1200 Sixth Avenue
Seattle, Washington 98101

National Environmental Research Center
200 S.W. 35th Street
Corvallis, Oregon 97330

SECTION I

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	A L A B A M A					
** RESEARCH **						
ALABAMA A&M UNIV. NORMAL	EFFECT OF LIMING PHOSPHATE,ORGANIC MATTER HEAVY METAL AVAILABILITY PLANTS GROWN SLUDGE-AMEND SOILS	SHUFORD, J.	80545601	NEW	77/09/27	$39,345
AUBURN UNIV. AUBURN	FATE AND EFFECTS OF ATRACINE IN SALT MARSH ECOSYSTEMS	ROUSE, R. D.	80383503	CONT	77/06/03	$40,400
AUBURN UNIV. AUBURN	DEWATERING PRINCIPLES AND EQUIPMENT DESIGN STUDIES	WARMAN, J.	80453102	CONT	77/05/02	$75,000
SOUTHERN RES. INST. BIRMINGHAM	APPLICABILITY OF ESP'S FOR CONTROL OF VOLATILE&TRACE METAL PARTICULATE FROM NONFERROUS METAL PRODUCT	OGLESBY, S.	80495502	CONT	77/09/15	$146,281
** TRAINING **						
JEFFERSON CNTY BD OF EDUCATION BIRMINGHAM	LAB TRAINING FOR WWT PLANT OPERATORS TO MEET SELF-MONITORING REQUIREMENTS	DR. J. REVIS HALL	00424301	NEW	77/05/16	$17,000
** FELLOWSHIPS **						
ALABAMA, UNIV. OF BIRMINGHAM	B. S./ENGR.	CAIN, VEDA M.	91080101	INCR	77/06/13	$2,971
ALABAMA, UNIV. OF BIRMINGHAM	B.S./ENGR.-PART TIME	JOHNSON, R.	91098701	NEW	77/08/05	$4,004
ALABAMA, UNIV. OF BIRMINGHAM	M.S./PUBLIC HEALTH-FULL TIME	RIEHL, M.	91110901	NEW	77/08/05	$5,902

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	A L A S K A					
** RESEARCH **						
ALASKA, UNIV. OF FAIRBANKS	ALASKAN OIL SEEPS: THEIR CHEMICAL & BIOLOGICAL EFFECTS ON THE ENVIRONMENT	SHAW, D. G.	80392203	CONT	77/06/21	$123,991
ALASKA, UNIV. OF FAIRBANKS	ASSESSMENT OF THE EFFECTS OF BOTTOM DISTURBANCE ON THE ENVIRONMENT OF A CLEAR SUBARCTIC STREAM	SCHALLOCK, E.	80394503	CONT	77/06/09	$33,238
ALASKA, UNIV. OF FAIRBANKS	OIL SPILLS: EFFECTS ON ARCTIC LAKE SYSTEMS	BARSDATE, R.	80451203	CONT	77/09/08	$156,180
ALASKA, UNIV. OF FAIRBANKS	CONSEQUENCES OF CRUDE OIL CONTAMINATION ON COLD CLIMATE SALT MARSHES & INSHORE ECOSYSTEMS	MCROY, C.	80566801	NEW	77/09/14	$34,966
EMMONAK, CITY OF EMMONAK	ALASKA VILLAGE RES. PROJECT	REDFOX, D.	80566001	NEW	77/09/12	$30,000
WAINWRIGHT, CITY OF WAINWRIGHT	ALASKA VILLAGE RESEARCH PROJECT	NAYAKIK, C.	80566101	NEW	77/09/14	$52,319

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	A R I Z O N A					
** RESEARCH **						
ARIZONA, UNIV. OF TUCSON	UTILIZE LIME,IRON OXIDES & FLUX CONTROL DESIGN DISPOSAL SITE LINERS MINIMIZE POLLUTION MIGRATION	FULLER, WALLACE H.	80398801	INCR	77/04/08	$17,168
ARIZONA, UNIV. OF TUCSON	ENVRN. MONITORING AND ASSESSMENT OF COAL STRIP MINING AND RECLAMATION IN THE FOUR CORNER'S AREA	FOGEL, M.M.	80467902	CONT	77/09/12	$145,000
ARIZONA, UNIV. OF TUCSON	USE OF ELECTROSTATICALLY CHARGED FOG FOR CONTROL OF DUST FROM OPEN SOURCES	HOENIG, S.	80522801	NEW	77/05/02	$49,996
ARIZONA, UNIV. OF TUCSON	POLLUTANTS AERO ALLERGENS AND RESPIRATORY DISEASES	LEDOWITZ, M.	80531801	NEW	77/07/12	$98,875
ARIZONA, UNIV. OF TUCSON	ANALYSIS AND CHARACTERIZATION OF ORGANIC CARBON COMPOUND IN ATMOSHERIC PARTICLATE MATTER	FREISER, H	80542701	NEW	77/09/28	$20,000
** DEMONSTRATION **						
ARIZONA DEPARTMENT OF HEALTH SERVICES PHOENIX	IMPLEMENTATION OF ARIZONA'S SOLID WASTE MANAGEMENT PLAN	BECK, JOHN H.	00909102	INCR	77/05/17	$24,900
			00909102	INCR	77/06/01	$28,000
** TRAINING **						
ARIZONA, UNIV. OF TUSSON	TRAINING IN WATER POLLUTION CONTROL	SIERKA, RAYMOND	90018605	INCR	77/08/31	$19,500
MARICOPA CO. COMM. COLLEGE DIST. PHOENIX	SEMINAR OF IDENTIFICATION, SOLUTION OF WW PLAN OPERATION & MAINTENANCE PROBLEMS	W. R. MORRISON	00914901	NEW	77/09/28	$6,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD

ARIZONA

** FELLOWSHIPS **

ARIZONA STATE UNIV. TEMPE	M.S./ENGR.	HOFFMAN, J. T.	91101301	NEW	77/08/04	$7,356

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	A R K A N S A S					
** RESEARCH **						
ARKANSAS STATE GAME AND FISH COMM, LITTLE ROCK	EVALUATION OF FILTER FEEDING FISHES FOR REMOVING EXCESSIVE NUTRIENTS & ALGAE FROM WASTEWATER	HENDERSON, S.	80545301	NEW	77/09/30	$63,112
ARKANSAS, UNIV. OF FAYETTEVILLE	DEVELOPMENT OF REAL TIME AEROSOL SIZE SPECTRUM ANALYZER	TESTERMAN, M.K.	80442901	INCR	77/09/22	$15,000
ARKANSAS, UNIV. OF FAYETTEVILLE	DEVELOPMENT OF REAL-TIME AEROSOL SIZE SPECTRUM ANALYZER EMPLOYING RELAXATION-TIME MEASUREMENT	TESTERMAN, M.	80442902	CONT	77/04/28	$33,000
ARKANSAS, UNIV. OF FAYETTEVILLE	MEASUREMENT OF VOLATILE CHEMICAL EMISSIONS FROM WW BASINS	THIBODEAUX, L. J.	80553401	NEW	77/09/06	$94,000
** TRAINING **						
ARKANSAS DEPT OF PC&E LITTLE ROCK	STATE WATER POLLUTION CONTROL MANPOWER DEVELOPMENT PROGRA	JOE B. SHAW	00619101	NEW	77/09/29	$8,500

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD

C A L I F O R N I A

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
CALIFORNIA DEPT. OF HEALTH SACRAMENTO	TECHNIQUE FOR IN-SITU CALIBRATION OF PARTICULATE MASS MONITORS	WESOLOWSKI, J.J.	80557701	NEW	77/09/21	$29,955
CALIFORNIA DEPT. OF HEALTH SACRAMENTO	PILOT STUDY OF ACUTE BRONCHITIS & ITS RELATION TO AIR POLLUTION	DEANE, M.	80559301	NEW	77/09/23	$24,831
CALIFORNIA INST. OF TECH. PASADENA	RELATIONSHIP OF SMOG AEROSOL TO POLLUTION SOURCES	FRIEDLANDER, S. K.	80216004	INCR	77/04/21	$60,000
CALIFORNIA INST. OF TECH. PASADENA	DEV.&APPLIC. OF MULTIPLE TRACER TECHNIQUES FOR STUDY OF POLLUTANT TRANSPORT&DISPERSION IN ATMOSPHERE	SHAIR, FREDERICK H.	80499001	INCR	77/07/08	$13,500
CALIFORNIA INST. OF TECH. PASADENA	EVALUATION OF THE ACCURACY AND VALIDITY OF PHYSICO-CHEMICAL AIR QUALITY MODELS	SEINFELD, JOHN H.	80553701	NEW	77/09/27	$110,180
CALIFORNIA STATE DEPT. OF HEALTH SACRAMENTO	HAZARDOUS WASTE SAMPLING, ANALYSIS & COMPATIBILITY STUDY	STEPHENS, R. D.	80469201	INCR	77/04/28	$211,000
			80469201	INCR	77/07/29	$50,000
CALIFORNIA STATE DEPT. OF HEALTH SACRAMENTO	IMPROVEMENT & EVALUATION OF METHODS FOR SULFATE ANALYSIS	WESOLOWSKI, J.	80544701	NEW	77/08/30	$69,324
CALIFORNIA STATE UNIV. FULLERTON	PRODUCTION IN COASTAL SALT MARSHES OF SOUTHERN CALIFORNIA	EILERS, H. PETER	80543801	NEW	77/07/28	$20,654
			80543801	INCR	77/09/12	$19,319

CALIFORNIA

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
CALIFORNIA, UNIV. OF DAVIS	IRRIGATION TAILWATER MANAGEMENT	TANJI, K. K.	80360302	INCR	77/09/20	$2,013
CALIFORNIA, UNIV. OF RIVERSIDE	OXIDANT/PRECURSOR RELATIONSHIPS	STEPHENS, E.	80379902	INCR	77/09/27	$30,000
CALIFORNIA, UNIV. OF BERKELEY	TOXAPHENE COMPOSITION AND TOXICOLOGY	CASIDA, J.	80391303	CONT	77/05/20	$45,000
CALIFORNIA, UNIV. OF BERKELEY	BIOLOGICAL CONTROL IN AN URBAN PEST MANAGEMENT SYSTEM	VAN DEN BOSCH, R.	80420502	CONT	77/09/26	$50,000
CALIFORNIA, UNIV. OF LA JOLLA	NATIONAL MARINE POLLUTION MONITORING PROGRAM	GOLDBERG, EDWARD D.	80421501	INCR	77/09/27	$350,000
CALIFORNIA, UNIV. OF BERKELEY	ASBESTOS IN DOMESTIC WATER SUPPLIES & CANCER INCIDENCE IN 5 CALIFORNIA COUNTIES	COOPER, R.	80436602	CONT	77/07/06	$122,400
CALIFORNIA, UNIV. OF RIVERSIDE	DETERMINATION & PREDICTION OF CHEMICAL FORM OF TRACE METALS IN SEWAGE SLUDGES & SLUDGE AMENDED SOILS	LUND, L.	80451602	CONT	77/08/04	$84,811
CALIFORNIA, UNIV. OF RIVERSIDE	MEASURE HALOGENATED POLLUTANTS & TRACE GASES TROPOSPHERE LONG-PATH IN-SITU INFRARED ABSORP SPECTRO	PITTS, J.	80454602	CONT	77/05/20	$76,961
CALIFORNIA, UNIV. OF LOS ANGELES	YERSINIA ENTEROCOLITICA RESERVIORS AND IMPORT IN HUMAN DISEASE	PICKETT, M.	80468102	CONT	77/08/31	$29,375
CALIFORNIA, UNIV. OF DAVIS	ANALYSIS OF BIOLOGICAL WASTEWATER TREATMENT PLANT PERFORMANCE	SCHROEDER, E. D.	80509701	NEW	77/04/07	$74,990

C A L I F O R N I A

**** RESEARCH ****

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
CALIFORNIA, UNIV. OF DAVIS	MUCUS GLYCOPROTEINS SECRETED BY TRACHEAL EXPLANTS FROM RATS EXPOSED TO POLLUTANTS	LAST, J. A.	80535501	NEW	77/09/06	$36,197
CALIFORNIA, UNIV. OF BERKLEY	ANALYSIS OF NCHS DATA ON NONMELANOMA SKIN CANCER	MANZA, A.	80537901	NEW	77/06/09	$27,340
			80537901	INCR	77/09/20	$6,450
CALIFORNIA, UNIV. OF RIVERSIDE	NATIONAL CONFERENCE ON MANAGEMENT OF NITROGEN IN IRRIGATED AGRICULTURE	PRATT, P. F.	80539401	NEW	77/06/03	$31,460
CALIFORNIA, UNIV. OF RIVERSIDE	IMPACT OF OXIDANT AIR POLLUTANTS ON WESTER CONIFEROUS FOREST ECOSYSTEM	TAYLOR, O.	80541001	NEW	77/07/14	$222,000
			80541001	INCR	77/09/15	$40,000
CALIFORNIA, UNIV. OF BERKELEY	FUNDAMENTAL CONSIDERATIONS IN THE PREPARATION OF REFUSE DERIVED FUELS	TREZEK, G. J.	80541401	NEW	77/06/30	$130,000
CALIFORNIA, UNIV. OF DAVIS	NONPOINT SOURCE SEDIMENT PRODUCTION IN THE COLUSA BASIN DRAINAGE AREA	TANJI, K.	80546201	NEW	77/09/12	$170,000
CALIFORNIA, UNIV. OF IRVINE	CHEMICAL REACTIONS OF ATMOSPHERIC HALOGENATED SPECIES	MOLINA, M.	80553201	NEW	77/08/29	$84,770
CALIFORNIA, UNIV. OF DAVIS	DENITRIFICATION AS AFFECTED BY IRRIGATION FREQUENCY OF A FIELD SOIL	ROLSTON, D.	80555001	NEW	77/09/29	$97,995

C A L I F O R N I A

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
CALIFORNIA, UNIV. OF BERKEKEY	A STUDY OF HOMEOWNER ATTITUDES & PRACTICES TOWARDS INSECTS & PESTICIDES IN THREE U. S. METRO. AREAS	FRANKIE, G.	80555601	NEW	77/09/12	$28,650
CALIFORNIA, UNIVERSITY OF LAJOLLA	NATIONAL MARINE POLLUTION MONITORING PROGRAM	GOLDBERG, EDWARD D.	80421501	INCR	77/07/15	$6,192
CHINO BASIN MUN. WATER DIST. CUCAMONGA	REDUCTION OF SALINE POLLUTION OF THE GROUNDWATER ATTRIBUTED TO DAIRY OPERATIONS	FERGUSON, R.	80462002	CONT	77/06/21	$32,578
CONTRA COSTA CNTY. HEALTH DEPT. MARTINZ	EPIDEMIOLOGICAL STUDY INCIDENCE CANCER RELATED INDUSTRIAL EMISSIONS HEAVILY INDUSTRIALIZED PART CNTY	WOOD, D.	80555101	NEW	77/09/27	$126,884
HYDROCOMP, INC. PALO ALTO	FINAL TESTING & COMPLETION OF THE WATERSHED-SCALE PESTICIDE AND NUTRIENT TRANSPORT MODEL	CRAWFORD, NORMAN H.	80372201	INCR	77/06/17	$24,677
LOMA LINDA UNIV. LOMA LINDA	CHROMOSOMAL ABERRATIONS PERIPHERAL LYMPHOCYTES COLLEGE STUDENTS FUNCTION PHOTOCHEMICAL AIR POLLUTION	MAGIE, A.	80460602	CONT	77/09/12	$138,398
MOULTON NIGUEL WATER DIST. LAGUNA	RESEARCH STUDY FOR CONTINUING DOCUMENTATION OF PURIFYING DOMESTIC SEWAGE BY USING AQUATIC PLANTS	O'CONNOR, J.	80527901	NEW	77/08/23	$65,000
OCCIDENTAL COLLEGE LOS ANGELES	SEASONAL CYCLES IN BODY COMPOSITION ORGAN SYSTEM FUNCTION & ENERGETICS OF GRASSLAND BIRDS COLSTRIP	MORTON, M.	80558101	NEW	77/09/12	$47,200
OXNARD, CITY OF OXNARD	DEVELOPMENT OF A REMOTELY OPERATED VEHICLE TO CONTROL HAZARDOUS MATERIAL SPILLS	GUSTAFSON, H. A.	80536501	NEW	77/07/27	$50,000
SOUTHERN CALIFORNIA EDISON CO. ROSEMEAD	WET/DRY COOLING TOWER TEST MODULE PROGRAM	MARTIN, W.	80522001	NEW	77/07/06	$100,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	C A L I F O R N I A					
** RESEARCH **						
SOUTHERN CALIFORNIA METRO. WATER DIST. LOS ANGELES	WATER QUALITY EFFECTS RELATED TO BLENDING WATERS OF DIFFERENT ORIGIN IN DISTRIBUTION SYSTEMS	PEARSON, H.E.	80470902	CONT	77/09/21	$59,000
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	IMPROVED SCORING OF CHEMICAL TRANSFORMATION OF C3H/10T1/2 CELLS	HEIDELBERGER, CHARLES	80520801	NEW	77/08/30	$289,042
STANFORD RESEARCH INST. MENLO PARK	REACTIONS OF OXY RADICALS IN THE ATMOSPHERE	HENDRY, DALE G.	80384603	CONT	77/06/20	$45,000
			80384603	INCR	77/09/22	$40,000
STANFORD RESEARCH INST. MENLO PARK	IDENTIFICATION OF RES. DEVELOPMENT & DEMO. NEEDS FOR POLLUTION CONTROL IN FOOD INDUSTRY	JONES, J. L.	80464201	INCR	77/05/20	$43,328
STANFORD UNIV. STANFORD	GROUNDWATER INJECTION OF RECLAIMED WATER IN PALO ALTO	MCCARTY, P.	80443102	CONT	77/05/11	$292,070
STANFORD UNIV. STANFORD	FEASIBILITY OF USING CHLORINE DIOXIDE IN THE DISINFECTION OF MUNICIPAL WASTEWATER	ROBERTS, P.	80542601	NEW	77/08/05	$69,030
TETRA TECH. INC. LAFAYETTE	MODELING FOR 208 AREA WIDE WASTE MGMT. PLANNING IN NON DESIGNATED AREAS	CHEN, C. W.	80445001	INCR	77/08/19	$15,000
WOODWARD CLYDE CONSULTANTS SAN FRANCISCO	WATER QUALITY AND BIOLOGICAL EFFECTS OF URBAN RUNOFF ON COYOTE CREEK	SARTOR, J.	80541801	NEW	77/09/30	$25,658
** DEMONSTRATION **						
CALIF. DEPT. OF HEALTH SERVICES SACRAMENTO	IMPLEMENTATION OF ENFORCEMENT ACTIVITIES OF CALIFORNIA'S HAZARDOUS WASTE MANAGEMENT PROGRAM	COLLINS, HARVEY F.	00913501	INCR	77/05/27	$166,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	C A L I F O R N I A					
** DEMONSTRATION **						
CALIFORNIA RESOURCES AGENCY SACRAMENTO	SOLID WASTE PROGRAM IMPLEMENTATION & DEMONSTRATION	ALBERT A MARINO	00913701	INCR	77/06/06	$70,000
MARYSVILLE, CITY OF MARYSVILLE	ELLIS LAKE - HYDRILLA ERADICATION	ONDEREK, J. C.	80525601	NEW	77/05/20	$1,375,000
NORTH MARIN CNTY. WATER DIST. NOVATO	STAFFORD LAKE - CLEAN LAKES GRANT PROGRAM	NELSON, J. O.	80491001	NEW	77/04/08	$290,250
ORANGE CNTY WATER DIST. FOUNTAIN VALLEY	EVALUATION OF FULL SCALE WW REUSE SYSTEM FOR DOMESTIC GROUNDWATER REPLENISHMENT	ARGO, DAVID G.	80387301	INCR	77/09/20	$55,000
** TRAINING **						
CALIF. S.W.R.C.B. SACRAMENTO	TNG OF WWT OPERATORS ON SITE TNG	ROBERT V DAIGH	00912401	INCR	77/08/18	$25,000
CALIF. STATE BOARD OF FIRE SERVICES SACRAMENTO	EMERGENCY HANDLING OF SPILLS & FIRES INVOLVING PESTICIDES & OTHER AGRICULTURAL CHEMICALS	EDWARD SEITS	00913001	INCR	77/05/25	$2,950
CALIFORNIA POLYTECHNIC STATE UNIV. SAN LUIS OBISPO	CAL POLY UNDERGRADUATE AND SUMMER TRAINING IN AIR POLLUTION	COTA, H.	90067901	NEW	77/07/27	$27,000
CALIFORNIA STATE UNIV. SACRAMENTO	REVISION AND EXPANSION OF OPERATION OF WASTE WATER TREATMENT PLANTS	KERRI, K.	90069001	NEW	77/05/10	$29,500
			90069001	INCR	77/09/23	$30,700
CALIFORNIA, UNIV. OF DAVIS	ENVRN. & ENGR. INCLUDING IRRIGATION SCIENCE & CHEMICAL ENGR.	KRONE, RAY B.	90013106	INCR	77/09/06	$22,200

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
CALIFORNIA						
** TRAINING **						
CALIFORNIA, UNIV. OF BERKELEY	PROFESSIONAL TRAINING IN WPC SCIENCE & ENGR.	SELLECK, ROBERT E.	90019005	INCR	77/09/06	$16,400
HUMBOLT STATE UNIV. ARCATA	INSTRUCTIONAL DEVELOPMENT WORKSHOPS	GEARHEART, ROBERT A.	90066401	INCR	77/09/06	$8,426
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	ENVIRONMENTAL MANAGEMENT INSTITUTE	BARBARO, G.	90055701	INCR	77/09/15	$135,979
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	RESEARCH & DEVELOPMENT OF METRO-APEX WATER PLANNING & GAMING SIMULATION	MCGINTY, RICHARD T.	90059301	INCR	77/07/06	$40,000
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	RESEARCH AND DEVELOPMENT OF METRO APEX WATER PLANNING GAMING SIMULATION	MCGINTY, R.	90059302	CONT	77/07/27	$115,000
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	DISSEMINATION OF APEX II	MCGINTY, R.	90070601	NEW	77/09/14	$17,100
STANFORD UNIV. STANFORD	ENVRN. & WATER QUALITY MGMT.	MCCARTY, PERRY L.	90013308	INCR	77/08/31	$27,000
** FELLOWSHIPS **						
CALIFORNIA STATE COLLEGE DOMINGUEZ HILLS	M.S./ENVRN. STUDIES	FISHER, E. L.	91093101	INCR	77/04/21	$175
CALIFORNIA STATE UNIV. LOS ANGELES	M.S./ELECTRICAL ENGR.-PART TIME	RADKE, NORMAN	91090301	INCR	77/08/15	$2,004
CALIFORNIA STATE UNIV. LONG BEACH	M.S./ENGR.	BANERJEE, S.	91101801	NEW	77/08/16	$296

C A L I F O R N I A

** FELLOWSHIPS **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
CALIFORNIA STATE UNIV. DOMINGUEZ HILLS	M.S./AIR POLLUTION CONTROL-FULL TIME	BORDINARO, A.	91103601	NEW	77/08/16	$7,655
CALIFORNIA STATE UNIV. FULLERTON	M.S./ENGR.	BOEHM, J. C.	91113601	NEW	77/08/29	$4,200
CALIFORNIA STATE UNIV. SACRAMENTO	M.S./CIVIL ENGR.	LEE, P. N. K.	91113901	NEW	77/08/30	$577
			91113901	INCR	77/09/20	$813
CALIFORNIA, UNIV. OF BERKELEY	M.S./AIR POLLUTION CONTROL-PART TIME AGENCY	PHILLIPS, J. E.	91085001	INCR	77/08/15	$1,320
CALIFORNIA, UNIV. OF DAVIS	M.S./CIVIL ENGR.	BENSON, PAUL E.	91106101	NEW	77/08/04	$4,201
CALIFORNIA, UNIV. OF BERKELEY	M.S./ENVRN. ENGR.-PART TIME	KENDALL, GARY R.	91106901	NEW	77/08/03	$2,605
CALIFORNIA, UNIV. OF BERKELEY	ENVRN. HEALTH SCIENCE	OLIVIERI, A.	91112901	NEW	77/09/19	$2,496
CONTROL DATA INST. LOS ANGELES	COMPUTER PROGRAMMING	ELVIN, BRUCE M.	91106801	NEW	77/09/15	$3,310
GOLDEN GATE UNIV. SAN FRANCISCO	M.S./PUBLIC ADMIN.	CHIU, A.	91103301	NEW	77/08/10	$3,523

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	CALIFORNIA					
** FELLOWSHIPS **						
GOLDEN STATE UNIV. SAN FRANCISCO	ENVRN. MGMT.	CONDIT, R. J.	91114101	NEW	77/09/23	$3,402
HEALD ENGINEERING COLLEGE SAN FRANCISCO	B.S./ENVRN. ENGR./PART TIME	DARDON, E.	91108701	NEW	77/08/19	$7,240
HEALD ENGR. COLLEGE SAN FRANCISCO	B. S./ELECTRONIC ENGR.	THOMSON, CHARLES P.	91088401	INCR	77/06/09	$2,357
LOYOLA MARYMOUNT UNIV. LOS ANGELES	M.S./ENVRN. ENGR.	RUDINICA, M.	91113701	NEW	77/08/29	$1,656
			91113701	INCR	77/09/26	$1,414
SAN BERNARDINO VALLEY COLL. SAN BERNARDINO	A.S./WATER SUPPLY	ARMAS, D.	91115101	NEW	77/09/22	$2,109
SAN JOSE STATE UNIV. SAN JOSE	B.S./MECH. ENGR.	SHIRLEY, R.	91109201	NEW	77/08/03	$7,161
SANTA CLARA, UNIV. OF SANTA CLARA	M.S./MECHANICAL ENGR.	MANGAT, T.	91077901	INCR	77/08/23	$3,581
SANTA CLARA, UNIV. OF SANTA CLARA	M.S./COMPUTER SCIENCE	LISTON, B.	91108201	NEW	77/08/16	$4,315
SANTA CLARA, UNIV. OF SANTA CLARA	M.S./COMPUTER SCIENCE-PART TIME	VILLANUEVA, R.	91109701	NEW	77/08/11	$3,925

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C A L I F O R N I A						
** FELLOWSHIPS **						
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	M.S./AIR POLLUTION CONTROL	VICKERY, JAMES S.	91078101	INCR	77/06/09	$2,501
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	M.S./PUBLIC ADMIN.	DANZIG, A.	91099601	NEW	77/08/19	$3,048
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	M. S./ENVRN. ENGR.	LONGWELL, R.	91101501	NEW	77/08/15	$11,458
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	M.S./PUBLIC ADMIN.	EATON, D.	91108401	NEW	77/08/29	$8,356
SOUTHERN CALIFORNIA, UNIV. OF LOS ANGELES	ENGR./PART TIME AGENCY	CHOI, B. J.	91113801	NEW	77/09/09	$2,780
STANFORD UNIV. STANFORD	ENGR./PART TIME	HANTZSCHE, N.	91115001	NEW	77/09/19	$3,065
STANFORD UNIV. STANFORD	M.S./CIVIL ENGR.	DUFFY, D.	91115401	NEW	77/09/23	$4,200
WESTERN STATE UNIV. FULLERTON	LAW	YOSHIDA, G.	91113501	NEW	77/09/23	$3,810

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C O L O R A D O						
** RESEARCH **						
AMERICAN WATER WORKS ASSOC. RES. FDN. DENVER	REMOVAL OF TRACE ORGANICS FROM WATER USING ACTIVATED CARBON & POLYMERIC ADSORBENTS	TARAS, MICHAEL J.	80443301	INCR	77/09/14	$14,925
BOULDER, CITY OF BOULDER	EVALUATION OF HIGH RATE INFILTRATION PERCOLATION BIDS TO IMPROVE WATER QUALITY	SMITH, D.	80393102	CONT	77/07/21	$41,304
COLORADO DEPT OF HEALTH DENVER	AIR & WATER QUALITY STUDIES IN COLORADO ENERGY AREAS	ROBERT SIEK, ACTING DI	00813102	INCR	77/09/30	$8,000
COLORADO SCH OF MINES RES. INST. GOLDEN	MINERALOGY OF OVERBURDEN RELATED TO GROUND-WATER DEGRADATION IN STRIP MINING IN COAL	KLOEPPER, D.	80416201	INCR	77/09/21	$275,000
COLORADO SCHOOL OF MINES GOLDEN	POLICY ANALYSIS FOR HAZARDOUS WASTE CONTROL	TAYLOR, G. C.	80466101	INCR	77/09/14	$5,413
COLORADO STATE UNIV. FORT COLLINS	VEGETATIVE STABILIZATION OF PARAHO SPENT OIL SHALE	BERG, W.	80378803	CONT	77/08/29	$43,301
COLORADO STATE UNIV. FORT COLLINS	TOXIC EFFECTS ON THE AQUATIC BIOTA FROM COAL AND OIL SHALE DEVELOPMENT	THURSTON, R. V.	80395002	INCR	77/04/22	$20,000
COLORADO STATE UNIV. FORT COLLINS	TOXIC EFFECTS ON THE AQUATIC BIOTA FROM COAL & OIL SHALE DEV.	THURSTON, ROBERT V.	80395003	CONT	77/09/19	$424,640
COLORADO STATE UNIV. FORT COLLINS	WATER-QUALITY HYDROLOGY OF SURFACE-MINED WATERSHEDS	MCWHORTER,D.	80467302	CONT	77/08/30	$38,509
COLORADO STATE UNIV. FORT COLLINS	VEGETATIVE STABILIZATION OF SPENT OIL SHALES	BERG, W. A.	80471901	INCR	77/08/10	$10,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C O L O R A D O						
** RESEARCH **						
COLORADO STATE UNIV. FORT COLLINS	IRRIGATION & GROUNDWATER MGMT FOR LAND DISPOSAL OF ANIMAL WASTES	WALKER, WYNN R.	80482701	INCR	77/04/21	$119,700
COLORADO STATE UNIV. FORT COLLINS	INVESTIGATE NUMERICAL ROLE VARIOUS HALOCARBON CHEMICAL REACTANTS STRATOSPHERIC&TROPOSPHERIC OZONE&PH	CRUTZEN, PAUL S.	80492102	CONT	77/08/30	$56,440
COLORADO STATE UNIV. FORT COLLINS	INTERACTION OF METAL IONS WITH ORGANIC LIGANDS IN NATURAL WATERS	NATUSCH, D.	80518301	NEW	77/04/07	$64,992
COLORADO STATE UNIV. FORT COLLINS	CROSS TRANSMISSION OF GIARDIA	HIBLER, CHARLES P.	80521501	NEW	77/04/22	$29,333
COLORADO STATE UNIV. FORT COLLINS	LONG-RANGE TRANSPORT & TRANSFORMATION MODEL FOR SO2 & SULFATE	REITER, E.	80527101	NEW	77/08/16	$40,000
COLORADO STATE UNIV. FORT COLLINS	EFFECTS ON CONTROLLED SULFUR DIOXIDE FUMIGATION ON PRIMARY PRODUCER AND INVERTEBRATE CONSUMERS	DODD, J.L.	80532001	NEW	77/07/26	$163,070
COLORADO STATE UNIV. FORT COLLINS	SOLID FILTRATION OF SEWAGE EFFLUENT OF RURAL AREA	SABEY, B. R.	80540101	NEW	77/07/08	$39,802
COLORADO STATE UNIV. FT. COLLINS	EFFECTIVENESS VEGETATION BUFFER STRIPS CONTROLLING SEDIMENT & OTHER POLLUTANTS DISTURBED WATERSHEDS	SIMONS, D.	80545701	NEW	77/09/22	$182,000
COLORADO, UNIV. OF BOULDER	DETERMINE HEALTH EFFECTS DATA & PREPARE CRITERIA DOCUMENT RECOMMENDING DRINKING WATER	CHAPPELL, W.	80364503	CONT	77/06/20	$158,780
COLORADO, UNIV. OF BOULDER	SEWAGE DISPOSAL BY EVAPORATION-TRANSPIRATION	BENNETT, EDWIN R.	80387101	INCR	77/05/02	$7,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	C O L O R A D O					
** RESEARCH **						
DENVER, UNIV. OF DENVER	STUDY OPERATING CHARACTERISTICS OF HOT-SIDE PRECIPITATORS	RINARD, G.	80532401	NEW	77/08/15	$148,666
DENVER, UNIV. OF DENVER	INVESTIGATION OF ENZYMATIC SCREENING TESTS FOR MUTAGENS IN ENVRN. POLLUTANTS	SCHMIDT-COLLERUS, J.	80567101	NEW	77/09/23	$40,000
RESOURCES ADMIN. AND DEVELOPMENT FORT COLLINS	ACHIEVING IRRIGATION RETURN FLOW QUALITY CONTROL THROUGH IMPROVED LEGAL SYSTEMS	RADOSEVICH, GEORGE E.	80430301	INCR	77/05/16	$7,586
** DEMONSTRATION **						
COLORADO DEPT. OF HEALTH DENVER	STATE OF COLORADO SOLID WASTE MANAGEMENT DEMONSTRATION PROJECT.	ORVILLE F. STODDARD, P	00817301	INCR	77/06/30	$44,000
DENVER METRO SEWAGE DISPOSAL DIST #1 COMMERCE CITY	DEMONSTRATION OF FULL-SCALE, OPEN-TANK, PURE OXYGEN-ACTIVATED SLUDGE SYSTEM	PUNTENNEY, JOHN L.	80391001	INCR	77/04/28	$35,000
STERLING COLORADO BEEF CO. STERLING	PROTEIN RECOVERY FROM MEATPACKING EFFLUENT	ADAMS, WALTER	80450501	NEW	77/09/27	$140,000
** TRAINING **						
AMERICAN WATER WKS. ASSOC. DENVER	TECHNICAL ASSISTANCE PROJECT ON SAFE DRINKING WATER ACT	HASKINS, B.	90073301	NEW	77/09/22	$380,225
COLORADO DEPT. OF HEALTH DENVER	WASTEWATER TREATMENT PLANT OPERATOR TRAINING	ATHONY ROBBINS, EXEC.	00819101	NEW	77/08/22	$11,000
COLORADO STATE UNIV. FORT COLLINS	WATER QUALITY MICROBIOLOGY & ENGR.	MORRISON, S. M.	90026605	INCR	77/09/14	$19,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	COLORADO					
** TRAINING **						
COLORADO STATE UNIV. FORT COLLINS	NATIONAL CENTER FOR MOTOR VEHICLE EMISSIONS CONTROL TRAINING	MANESS, M.	90071801	NEW	77/09/20	$99,996
DENVER COMMUN. COLLEGE DENVER	STAFF GUIDE DEVELOPMENT PROJECT GRANT	ZGUT, J.	90070801	NEW	77/09/15	$18,900
DENVER COMMUN. COLLEGE DENVER	WATER/WASTEWATER STUDENT AIR PROGRAM	ZGUT, JO ELEN	90075601	NEW	77/09/26	$7,000
NATIONAL CONFERENCE STATE LEGISLATORS DENVER	STATE LEGISLATIVE IMPLEMENTATION OF SECTION 208	KURTZ, K.	90065801	NEW	77/06/28	$92,249
** FELLOWSHIPS **						
COLORADO STATE UNIV. FORT COLLINS	M.S./ENVRN. ADMIN. & PLANNING-FULL TIME	FORD, KARL L.	91107901	NEW	77/08/16	$7,798
COLORADO, UNIV. OF DENVER	B.S./CIVIL ENGR.	KINSEY, JOHN	91065901	INCR	77/09/12	$1,480

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
C O N N E C T I C U T						
** RESEARCH **						
CONNECTICUT, UNIV. OF STORRS	GENETIC VARIATION & RESISTANCE TO CARCINOGENS IN NATURAL WATERS	SCHULTZ, R. JACK	80519501	NEW	77/05/26	$40,000
SIAM INST. FOR MATHEMATICS & SOC. NEW CANAAN	STATISTICS & ENVIRONMENTAL HEALTH	THOMSEN, D.	80493202	CONT	77/09/15	$100,000
** DEMONSTRATION **						
CONN. DEPT. OF ENVIR. PROTECTION HARTFORD	STATE SOLID WASTE DEMO GRANT	JOESEPH L. BOREN	00113301	INCR	77/07/06	$45,000
** TRAINING **						
CONNECTICUT PUBLIC TV HARTFORD	BIOGRAPHY OF A DRINK OF WATER	BINFORD, J. A.	90058001	INCR	77/04/01	$60,876
CONNECTICUT STATE HEALTH DEPT HARTFORD	WATER SUPPLY STATE TRAINING	WOODHULL, R.	90074601	NEW	77/09/22	$990
** FELLOWSHIPS **						
CONNECTICUT, UNIV. OF STORRS	M.S./CIVIL ENGR.	CURTIS, B.	91112501	NEW	77/08/31	$2,147
NEW HAVEN, UNIV. OF WEST HAVEN	M.S./AIR POLLUTION CONTROL-PART TIME AGENCY	DOOLITTLE, W.	91083801	INCR	77/08/01	$3,437
NEW HAVEN, UNIV. OF WEST HAVEN	M.S./ENVRN. ENGR.	SIMONE, L.	91085401	INCR	77/08/05	$2,660

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	D E L A W A R E					
** RESEARCH **						
DELAWARE, UNIV. OF LEWES	FOURTH BIENNIAL INTERNATIONAL ESTUARINE RESEARCH CONFERENCE	CARRIKER, MELBOURNE	80548901	NEW	77/08/23	$20,000

DISTRICT OF COLUMBIA

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
AMERICAN PETROLEUM INST. WASHINGTON	SHORELINES & SALT MARSH AREAS PROTECTION & RESTORATION	NANNEY, T.	80463902	CONT	77/09/27	$79,000
HOWARD UNIV. WASHINGTON	GENETIC & CELLULAR EFFECTS OF MICROWAVE RADIATION	DUTTA, S.	80356103	CONT	77/05/10	$43,500
HOWARD UNIV. WASHINGTON	APPLICATION OF FIREFLY LUCIFERASE BACTERIAL ATP ASSAY TO MEASURE EFFICIENCY OF WATER SUPPLY TREATMEN	OKREND, H.	80562701	NEW	77/09/14	$59,000
NATIONAL CENTER FOR RESOURCE RECOVERY WASHINGTON	PREPARATION, USE, AND COST OF D-RDF AS A SUPPLEMENTARY FUEL IN STOKER FIRED BOILERS	ALTER, HARVEY	80415001	INCR	77/07/19	$289,750
PUBLIC TECH, INC. WASHINGTON	STATUS OF OZONATION & CHLORINE DIOXIDE TECHNOLOGIES FOR TREATMENT OF MUNICIPAL WATER SUPPLIES	MILLER, G. WADE	80438501	INCR	77/05/12	$12,000
SMITHSONIAN INST. WASHINGTON	NON POINT POLLUTION STUDIES ON AGRICULTURAL LAND USE TYPES PREVALENT IN COASTAL PLAIN ZONE OF MD.	CORRELL, D. L.	80453601	INCR	77/05/16	$181,423
UNITED STATES DEPT. OF AGRICULTURE WASHINGTON	PLANNING & CONDUCTING THE IX INTERNATIONAL CONGRESS OF PLANT PROTECTION	TWEEDY, B.	80541701	NEW	77/08/30	$5,000
** DEMONSTRATION **						
INSTITUTE OF INDUSTRIAL LAUNDERERS WASHINGTON	DEMONSTRATION OF ULTRAFILTRATION&CARBON ADSORPTION FOR TREATMENT OF INDUSTRIAL LAUNDERING WASTEWATER	HUMPHREY, CHARLES E.	80436701	INCR	77/05/02	$20,387
INTERNATIONAL CITY MGMT ASSISTANT WASHINGTON	SOLID WASTE TECHNICAL ASSISTANCE FOR LOCAL GOVERNMENT MANAGERS	BARTOLLOTTA, ROBERT J.	80436001	INCR	77/04/22	$31,945
** TRAINING **						
CONSERVATION FDN WASHINGTON	CONSTRUCTING MUN. SEWAGE TREATMENT FACILITIES	RASTATTER, C.	90070501	NEW	77/09/29	$138,748

DISTRICT OF COLUMBIA

** TRAINING **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
CONSERVATION FDN. WASHINGTON	CITIZEN PARTICIPATION IN STATEWIDE 208 PLANNING-REGION 4	RASTATTER, C.	90068901	NEW	77/06/30	$54,895
			90068901	INCR	77/09/23	$30,000
ENVRN. ACTION FDN. WASHINGTON	CITIZEN ASSISTANCE TO STATE IMPLEMENTATION OF RCRA	MUNSON, R.	90072101	NEW	77/09/19	$55,000
GEORGETOWN UNIV. WASHINGTON	NATIONAL COAL POLICY PROJECT	MURRAY, F.	90076201	NEW	77/09/26	$25,000
LEAGUE OF WOMEN VOTERS WASHINGTON	208 WATER QUALITY MANAGEMENT PROJECT	O'MARA, C.	90068501	NEW	77/06/30	$105,339
LEAGUE OF WOMEN VOTERS EDUCATION FUND WASHINGTON	PUBLIC EDUCATION TO SUPPORT HAZARDOUS & SOLID WASTE MGMT	VALDES-COGLIANO, SALLY	90071501	NEW	77/09/29	$95,444
METRO SEWERAGE AGENCIES, ASSOC OF WASHINGTON	PROFESSIONAL TRAINING OF MUNICIPAL TREATMENT AGENCY DIRECTORS IN 208 PLANNING & IMPLEMENTATION	LINTON,R.	90070701	NEW	77/09/30	$59,755
NATIONAL ASSOC OF COUNTIES RES FDN WASHINGTON	TECHNICAL ASSISTANCE FOR COUNTIES IN SOLID WASTE MANAGEMENT	BULGER, THOMAS J.	90065701	INCR	77/04/21	$32,000
NATIONAL ASSOC. OF CONSERVATION DIST. WASHINGTON	EDUCATION & TECHNICAL TRANSFER FOR IMPLEMENTING NPS PHASE OF 208	UNGER, DAVID G.	90074401	NEW	77/09/26	$19,524
NATIONAL ASSOC. OF COUNTIES WASHINGTON	PROPOSAL TO ASSIST WITH IMPLEMENTATION OF CLEAN AIR ACT AMENDMENTS OF 1977	WEAVER, R.	90075701	NEW	77/09/29	$50,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	D I S T R I C T O F C O L U M B I A					
** TRAINING **						
NATIONAL ASSOC. OF REGIONAL COUNCILS WASHINGTON	IMPLEMENTATION OF THE CLEAN AIR ACT	WEBSTER, R.	90076301	NEW	77/09/29	$60,740
NATIONAL GOVERNORS CONFERENCE WASHINGTON	STATE INITIATIVES TOWARD IMPLEMENTATION OF THE RESOURCE CONSERVATION AND RECOVERY ACT OF 1976	HELMINSKI, E.	90068601	NEW	77/04/14	$100,000
NATIONAL LEAGUE OF CITIES WASHINGTON	RESOURCE CONSERVATION COMMITTEE PUBLIC PARTICIPATION	WILLIAMS, L. A.	90060701	INCR	77/08/16	$10,005
			90060701	INCR	77/04/21	$32,000
NATIONAL WILDLIFE FEDERATION WASHINGTON	TRAINING PROGRAM FOR CITIZEN PARTICIPATION IN 208 PLANNING	GOLTEN, R. J.	90063301	INCR	77/05/12	$3,060
** FELLOWSHIPS **						
AMERICAN UNIV. WASHINGTON	M.S./TECH. MGMT./PART TIME AGENCY	DAVIDSON, W. F.	91112401	NEW	77/09/14	$2,568
AMERICAN UNIV. WASHINGTON	PH.D./WATER QUALITY	BOSTATER, C.	91114601	NEW	77/09/19	$3,852
GEORGE WASHINGTON UNIV. WASHINGTON	M.S./ENVRN. CONTR. ENGR.	MENDELSOHN, E. S.	91087001	INCR	77/06/10	$2,431
GEORGE WASHINGTON UNIV. WASHINGTON	M.S./ENVRN. SCIENCE/PART TIME AGENCY	NUNN, A.	91110401	NEW	77/09/08	$1,889
GEORGE WASHINGTON UNIV. WASHINGTON	M.S./ENVRN. PLANNING/LAW	CASTLE, CONSTANCE L.	91111401	NEW	77/07/28	$3,857

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	DISTRICT OF COLUMBIA					
** FELLOWSHIPS **						
GEORGE WASHINGTON UNIV. WASHINGTON	WATER SUPPLY-PART TIME AGENCY	PIEPER, C.	91112001	NEW	77/09/30	$3,474

FLORIDA

**** RESEARCH ****

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
AMERCIAN ELECTROPLATERS' SOCIETY WINTER PARK	FIELD EVAL. OF NEW REVERSE OSMOSIS MEMBRANES FOR CLOSED-LOOP TREATMENT OF ELECTROPLATING RINSEWATERS	SCHUMACHER, J.	80530001	NEW	77/06/24	$83,000
CHARLOTTE HARBOR WATER ASSOC, INC. CHARLOTTE HARBOR	STUDY OF REVERSE OSMOSIS FOR REMOVAL OF CONTAMINANTS FROM DRINKING WATER	DARBY, WILLIAM D.	80520701	NEW	77/07/27	$232,950
DADE CNTY, DEPT PUBLIC HEALTH MIAMI	REMOVE ORGANIC CONTAMINANTS FROM GROUND WATER/PREVENT FORMATION/POTENTIAL CARCINOGENS/DRINKING WATER	MORGAN, RICHARD A.	80452101	INCR	77/04/21	$111,096
FLORIDA STATE OFFICE OF HEALTH TAMPA	MONITORING FOR PATHOGENIC NAEGLERIA	WELLINGS, F.	80437502	CONT	77/04/01	$84,121
FLORIDA STATE UNIV. TALLAHASSEE	MESOSCALE SULFUR BALANCE STUDIES	WINCHESTER, J.	80388702	INCR	77/09/12	$32,218
			80388702	INCR	77/09/22	$122,022
FLORIDA STATE UNIV. TALLAHASSEE	ACCELERATOR BASED METHODS OF AEROSOL ANALYSIS FOR BERYLLIUM	NELSON, J. WILLIAM	80437601	INCR	77/07/27	$40,000
FLORIDA STATE UNIV. TALLAHASSEE	DETERMINATION OF STATISTICAL METHODS USED TO IDENTIFY TROPHO-DYNAMIC INVOLVEMENT	LIVINGSTON, R. J.	80528801	NEW	77/07/20	$100,000
FLORIDA UNIV. OF LAKE ALFRED	WORKER REENTRY IN FL CITRUS PESTICIDES IN THE AGRICULTURAL ENVIRONMENT	NIGG, H. N.	80463302	CONT	77/09/20	$51,982
FLORIDA, UNIV. OF GAINESVILLE	A GUIDE FOR COMPREHENSIVE PLANNING FOR CONTROL OF URBAN STORM & COMBINED SEWER RUNOFF	HUBER, WAYNE C.	80241102	INCR	77/05/12	$59,710

FLORIDA

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NU	TYPE OF GRANT	DATE OF AWARD	AMOUNT UF GRANT AWARD
FLORIDA, UNIV. OF GAINESVILLE	STUDY OF INTERFACE PROBLEMS IN SAMPLING & MEASUREMENT OF PARTICULATE POLLUTANTS IN HOT STACK GASES	LUNDGREN, D.	80369203	CONT	77/05/10	$30,000
FLORIDA, UNIV. OF GAINESVILLE	URINARY STONE DISEASE AND WATER HARDNESS	FINLAYSON, B.	80453002	CONT	77/08/19	$446,324
FLORIDA, UNIV. OF GAINESVILLE	SEWAGE SLUDGE-VIRAL & PATHOGENIC AGENTS IN SOIL-PLANT-ANIMAL SYSTEMS	DAVIDSON, J. M.	80457002	CONT	77/08/02	$274,301
FLORIDA, UNIV. OF GAINESVILLE	MORPHOMETRIC EVALUATION OF THE PULMONARY EFFECTS OF AIR POLLUTANTS	HYDE, D.	80531601	NEW	77/08/29	$49,028
FLORIDA, UNIV. OF GAINESVILLE	CHEMICAL CONTROL OF WATER QUALITY IN DISTRIBUTION SYSTEMS	SINGLEY, J.	80540001	NEW	77/09/14	$55,602
FLORIDA, UNIV. OF GAINESVILLE	RELATIONSHIP BETWEEN BLACK MANGROVE FOREST AND ESTUARINE WATERS	LUGO, A.	80542401	NEW	77/06/21	$35,000
FLORIDA, UNIV. OF GAINESVILLE	RETENTION AND TRANSFORMATIONS OF PHOSPHOROUS AND SELECTED PESTICIDES IN SOILS AND SEDIMENTS.	RAO, P.	80552901	NEW	77/09/27	$182,949
FLORIDA, UNIV. OF GAINESVILLE	LOADING RATES&ECOLOGICAL SIGNIFICANCE OF NUTRIENTS &ACIDITY&DRY ATMOSPHERIC PRECIPITATION	BREZONIK, PATRICK L.	80556001	NEW	77/08/19	$45,000
FLORIDA, UNIVERSITY OF GAINESVILLE	EVALUATION OF WASTE CITRUS ACTIVATED SLUDGE IN POULTRY FEEDS	DAMRON, B. L.	80399701	INCR	77/07/27	$2,521
MIAMI, UNIV. OF MIAMI	ISOLATION AND STUDY OF CHLOR ORGANICS RESULTING FROM CHLORINATION OF SEAWATER	CARPENTER. J.	80389302	INCR	77/05/25	$30,000

FLORIDA

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MIAMI, UNIV. OF MIAMI	ISOLATION AND STUDY OF CHLORO-ORGANICS RESULTING FROM CHLORINATION OF SEAWATER	CARPENTER, J.	80389303	CONT	77/06/24	$130,000
			80389303	INCR	77/09/02	$100,000
MIAMI, UNIV. OF CORAL GABLES	MAN'S EXPOSURE TO HALOGENATED ORGANICS FROM HIS DRINKING WATER	ENOS, HENRY	80461102	CONT	77/09/28	$179,845
MIAMI, UNIV. OF CORAL GABLES	PESTICIDE RESEARCH, TRAINING & LABORATORY VALIDATION PROJECT	DAVIES, JOHN E.	80462301	INCR	77/04/21	$70,000
MIAMI, UNIV. OF MIAMI	SOUTHEAST FLORIDA OCEAN OUTFALL STUDY	SNEDAKER, S. C.	80474901	INCR	77/09/14	$200,000
MIAMI, UNIV. OF CORAL GABLES	INACTIVATION ON NATURALLY OCCURRING ENTEROVIRUSES	BEASLEY, ANNIE	80478002	CONT	77/09/15	$59,129
MIAMI, UNIV. OF CORAL GABLES	PESTICIDE EFFECTS ON PRENATAL CARDIOVASCULAR PHYSIOLOGY	GRABOWSKI, C.	80530101	NEW	77/06/13	$27,504
OHIO STATE UNIV. RES. FDN. MIAMI	LIMNOLOGICAL INVESTIGATIONS OF WATER QUALITY & FISH LARVAE IN LAKE ERIE	HOUDE, EDWARD	80451902	CONT	77/05/10	$18,525
WEST FLORIDA, UNIV. OF PENSACOLA	TOXIC SUBLETHAL & LATENT EFFECTS OF SELECTED PETROLEUM HYDROCARBONS & BARIUM SULFATE	RAO, K. RANGA	80454101	INCR	77/09/27	$80,012
WEST FLORIDA, UNIV. OF PENSACOLA	WATER QUALITY & EUTROPHICATION STUDIES IN SANTA ROSA SOUND IN THE PROXIMITY OF ESCAMBIA & SANTAROSA	MOSHIRI, G.	80536601	NEW	77/08/16	$28,333

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
		F L O R I D A				
** TRAINING **						
FLORIDA, UNIV. OF GAINESVILLE	LAB TRAINING FOR WSWT TRMT OPERATORS TO MEET SELF-MONITORING REQUIREMENTS	DR RICHARD D PALMER	00424601	NEW	77/05/26	$1,000
FLORIDA, UNIV. OF GAINESVILLE	AIR POLLUTION TRAINING PROGRAM	URONE, P.	90054203	CONT	77/09/09	$30,000
** FELLOWSHIPS **						
FLORDIA, UNIV. OF GAINESVILLE	M.S./ENVRN. ENGR.	GORE, RONALD WAYNE	91102101	NEW	77/07/29	$11,450
FLORIDA STATE UNIV. TALLAHASSEE	M.S./BIOLOGY/ENVRN. PLANNING/PART TIME AGENCY	CRAFT, J.	91115201	NEW	77/09/27	$4,200
FLORIDA, UNIV. OF GAINESVILLE	M.S./ENVRN. ENGR.	HAZEN, I.	91100401	NEW	77/07/28	$7,950
FLORIDA, UNIV. OF GAINESVILLE	M.S./ENGR.	EVANS, BERNARD	91101101	NEW	77/08/04	$1,615
FLORIDA, UNIV. OF GAINESVILLE	M.S./ENVRN. ENGR.	MANNING, J.	91103501	NEW	77/08/29	$4,744
FLORIDA, UNIV. OF GAINESVILLE	M.S./ENVRN. HEALTH	RUGGLES, A.	91104901	NEW	77/07/29	$10,386
FLORIDA, UNIV. OF GAINESVILLE	M.S./ENGR.	WHITE, J. C.	91113001	NEW	77/08/31	$4,200

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD

G E O R G I A

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
ATLANTA UNIV. ATLANTA	DEVELOPMENT OF METHODS FOR THE STABILIZATION OF PYROLYTIC OILS	POLK, M.	80444002	CONT	77/06/30	$63,470
ATLANTA UNIV. CENTER ATLANTA	STUDIES ON THE MUTAGENICITY OF CHEMICAL CARCINOGENS	SHEEHY, R.	80420402	CONT	77/06/30	$77,198
ATLANTA 2000 INC. ATLANTA	URBAN ENVRN. FUTURES CONFERENCE	HANIE, R.	80549101	NEW	77/08/15	$20,000
CLARK COLLEGE ATLANTA	STUDY OF VAPOR PRESSURES OF SYSTEMS FORMING ATMOSPHERIC AEROSOLS	BROWN, G. R.	80447001	INCR	77/04/15	$13,535
FORT VALLEY STATE COLLEGE FORT VALLEY	PATENTIAL BENEFICAL USE OF INDUSTRIAL WASTE HEAT FOR GREENHOUSE PRODUCTION OF BEDDING PLANTS	CRUMBLY, I.	80449902	CONT	77/09/26	$85,685
GEORGIA INST. OF TECH. ATLANTA	CONTROLLED LANDFILL STABILIZATION WITH LEACHATE RECYCLE	POHLAND, F.	80395302	CONT	77/04/11	$25,000
			80395302	INCR	77/09/08	$2,024
GEORGIA INST. OF TECH. ATLANTA	UTILIZATION &/OR STABILIZATION OF PYROLYTIC OIL FROM PYROLYSIS OF AGRICULTURAL,MUNICIPAL&OTHER WASTE	KNIGHT, JAMES A.	80441602	CONT	77/08/31	$61,750
GEORGIA STATE UNIV. ATLANTA	EFFECTS OF POLLUTANTS ON MICROBIAL ACTIVITIES IN ESTUARINE SURFACE FILMS	AHEARN, D.	80447702	CONT	77/05/10	$40,000
GEORGIA, UNIV. OF ATHENS	IMPACT OF NUTRIENT & SEDIMENTS ON SURFACE WATERS IN THE U.S.	GOLLEY, F.	80486802	CONT	77/09/29	$100,035

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
GEORGIA						
** RESEARCH **						
WILLIAM SCHOFIELD ATLANTA	COMBINE RUN OFF HYDRAULIC AND WATER QUALITY MODELS	SCHOFIELD, W.	80547101	NEW	77/08/30	$15,000
** TRAINING **						
ATLANTA UNIV. CTR. ATLANTA	WATER POLLUTION CONTROL DESIGN ENGR.	MERIDETH, C.	90050503	INCR	77/09/20	$19,154
GA ENVIRONMENTAL PROTECTION DIVISION ATLANTA	PROVIDE CLASSROOM & ON-THE-JOB TRAINING FOR WWT PLANT OPERATORS	J. LEONARD LEDBETTER	00424401	NEW	77/05/16	$29,000
GEORGIA STATE DEPT NATURAL RESOURCES ATLANTA	WATER SUPPLY TRAINING	FERNSTROM, J.	90073101	NEW	77/09/14	$5,200
SAVANNAH STATE COLLEGE SAVANNAH	GUIDEBOOK FOR WATER POLL. CONTROL TRAINING PROGRAMS IN RURAL AREAS	BANKS, R.	90073701	NEW	77/09/27	$15,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	I D A H O					
** RESEARCH **						
IDAHO, UNIV. OF MOSCOW	EVALUATE PRACTICES&SYSTEMS FOR CONTROLLING LOSS OF SEDIMENT&OTHER POLLUTANTS FROM IRRIGATED LAND	FITZSIMMONS, D. W.	80352402	INCR	77/06/28	$3,190
IDAHO, UNIV. OF MOSCOW	FIELD STUDIES OF COOK COASTAL INLET WETLANDS, ALASKA	RABE, F.	80569001	NEW	77/09/23	$50,220
MORGAN, RANDALL TWIN FALLS	33 TONS PER ACRE,23-MIN,16MM SOUND FILE (COLOR) DEALING W/IRRIGATION, SOIL EROSION & WATER POLLUTION	MORGAN, R.	80522601	NEW	77/04/15	$52,007
** TRAINING **						
ID DEPT. OF HEALTH & WELFARE BOISE	WASTEWATER OPERATOR TRAINING PROGRAM	MILTON G. KLEIN, DIREC	00010801	INCR	77/09/16	$20,000
IDAHO STATE UNIV. POCATELLO	WATER SUPPLY TRAINING GRANT	ORE, T.	90075801	NEW	77/09/29	$5,200

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	ILLINOIS					
** RESEARCH **						
AMERICAN SOCIETY OF ANIMAL SCI. CHAMPAIGN	ALTERNATIVES IN ANIMAL WASTE UTILIZATION - CONFERENCE	FONTENOT, J. P.	80554701	NEW	77/08/23	$2,000
ATLANTIC RICHFIELD CO. HARVEY	POWDERED CARBON ACTIVATED SLUDGE FILTRATION PROCESSES FOR PETROLEUM REFINERY WASTEWATER	KNECHT, A. T.	80473101	INCR	77/09/26	$121,661
CHICAGO METRO. SAN. DIST. CHICAGO	ENVRN CHANGES AGRICULTURAL BENEFITS FROM USING MUN SEWAGE SLUDGE/CROP PRODUCTION/STRIP-MINED SOILS	BRAXTON, J. S.	80562901	NEW	77/09/27	$150,000
CHICAGO, CITY OF CHICAGO	TECHNICAL, ECONOMIC & ENVRN. EVALUATION OF CITY OF CHICAGO REFUSE-DERIVED FUEL PROJECT	DEGNAN, F.	80562101	NEW	77/09/29	$151,258
DEPAUL UNIV. CHICAGO	INPUT OF HAZARDOUS MATERIALS FROM THE ATMOSPHERE TO SAGINAW BAY	MURPHY, T.	80532501	NEW	77/05/02	$41,187
GOVERNORS STATE UNIV PARK FOREST SOUT	AN EXPERIMENTAL STUDY OF LAKE LOADING	W E ENGBRETSON PRES	00530101	INCR	77/04/20	$19,611
			00530101	INCR	77/07/25	$71,889
IIT RES. INST. CHICAGO	EFFECTS OF CONVENTIONAL AND ADVANCED COAL CONVERSION BY PRODUCTS ON THE PULMONARY SYSTEM	ARANYI, C.	80531701	NEW	77/06/30	$148,853
			80531701	INCR	77/08/16	$1,000
IIT RESEARCH INST. CHICAGO	A STUDY OF THE IDENTITY & SOURCES OF ATMOSPHERIC AEROSOLS	DRAFTZ, RONALD G.	80307803	INCR	77/05/20	$25,000

I L L I N O I S

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
IIT RESEARCH INST. CHICAGO	A STUDY OF SOME IMPORTANT AIR POLLUTANTS	SOLOMON, I. J.	80380502	INCR	77/07/06	$27,985
IIT RESEARCH INST. CHICAGO	EFFECT OF INDUSTRIAL PARTICULATE EMISSIONS ON ALVEOLAR MACROPHAGES	ARANYI, C.	80514101	INCR	77/09/07	$89,973
ILLINOIS INST. OF TECH. CHICAGO	SHORT COURSE ON THE APPLICATION OF COMPUTER PROGRAMS IN PRELIMINARY DESIGN OF WWT FACILITIES	MALE, W.	80513401	NEW	77/04/22	$30,678
ILLINOIS UNIV. OF VETERINARY MEDICINE URBANA	HELMINTH TRANSMISSION IN ANAEROBICALLY DIGESTED SEWAGE SLUDGE	FITZGERALD, P.	80531501	NEW	77/09/08	$193,085
ILLINOIS, UNIV. OF URBANA	PREDICTING ORGANIC CONTAMINANT REMOVAL BY CLAY MINERALS & WASTE MATERIALS	GRIFFIN, ROBERT A.	80468401	INCR	77/04/15	$75,359
			80468401	INCR	77/09/27	$50,000
ILLINOIS, UNIV. OF URBANA	IMPACT ASSESSMENT OF ENERGY CONVERSION FACILITIES IN THE OHIO RIVER BASIN	STUKEL, JAMES J.	80484801	INCR	77/04/21	$42,100
ILLINOIS, UNIV. OF URBANA	REACTION OF ACTIVATED CARBON WITH AQUEOUS CHLORINE AND OTHER DISINFECTING AGENTS	SNOEYINK, V.	80529301	NEW	77/06/22	$56,435
ILLINOIS, UNIV. OF CHICAGO	BIOSYNTHESIS OF N-NITROSO COMPOUNDS FROM TRACE LEVEL PRECURSORS IN LABORATORY ANIMALS	EPSTEIN, S.	80543101	NEW	77/09/12	$100,594
ILLINOIS, UNIV. OF CHICAGO	METHODOLOGIES FOR UTILIZATION OF ENVRN.-IMPACT-ASSESSMENT DATA	BABCOCK, L.	80547601	NEW	77/08/15	$64,802

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
ILLINOIS						
** RESEARCH **						
ILLINOIS, UNIV. OF URBANA	OHIO RIVER BASIN ENERGY STUDY:PHASE II:ILLINOIS CORE TEAM PARTICIPATION	STUKEL, JAMES, J.	80558701	NEW	77/09/22	$125,000
ILLINOIS, UNIV. OF URBANA	OHIO RIVER BASIN ENERGY STUDY: PHASE II: EXPERIMENTAL MANAGEMENT PLAN	STUKEL, J.	80558801	NEW	77/09/22	$80,000
ILLINOIS, UNIV. OF URBANA	ROLE AQUATIC COMMUNITIES EVALUATING STRATEGIES, ESTABLISHING STANDARDS & MONITORING WATER QUALITY	BRIGHAM, WARREN U.	80561401	NEW	77/09/21	$140,000
ILLINOIS, UNIV. OF URBANA	CONFERENCE: "INTERGOVERNMENTAL ENERGY AND ENVIRONMENTAL COOPERATION: OHIO VALLEY	GOVE, S.K.	80561501	NEW	77/09/27	$16,230
NORTHWESTERN UNIV. EVANSTON	MEASUREMENT & EVALUATION PROCEDURES FOR ENVRN. RES. & DEVELOPMENT	RUBENSTEIN, A.	80535601	NEW	77/06/03	$136,451
NORTHWESTERN UNIV. EVANSTON	CAUSE OF DEATH OF ANESTHETISTS FROM THE CHLOROFORM ERA	LINDE, H.	80547301	NEW	77/09/14	$56,425
** DEMONSTRATION **						
AMERICAN PUBLIC WORKS ASSOC. CHICAGO	EVALUATION & TECHNOLOGY TRANSFER OF SWIRL CONCENTRATOR PRINCIPLE	SULLIVAN, RICHARD H.	80315701	INCR	77/09/14	$28,200
** TRAINING **						
AMERICAN PUBLIC WORKS ASSOC. CHICAGO	PROVIDE INCREASED SOLID WASTE MANAGEMENT SERVICES TO STATE AND LOCAL AGENCIES	FLEMING, R.	90068201	NEW	77/04/22	$58,100
ILLINOIS STATE EPA SPRINGFIELD	WATER SUPPLY GRADUATE PROGRAM	MARKWOOD, I.	90073001	NEW	77/09/08	$2,600

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD

I L L I N O I S

** TRAINING **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
ILLINOIS, UNIV. OF URBANA	WATER QUALITY CONTROL	ENGELBRECHT, R. S.	90031205	INCR	77/09/30	$31,200
ILLINOIS, UNIV. OF URBANA	GRADUATE TRAINING IN AIR POLLUTION	FORNEY, L.	90068701	NEW	77/09/28	$30,000
SOUTHERN ILLINOIS UNIV. EDWARDSVILLE	STAFF GUIDE DEVELOPMENT	BRYANT, JAMES D.	90070001	NEW	77/09/02	$21,520

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	I N D I A N A					
** RESEARCH **						
INDIANA AERONAUTICS COMM. INDIANAPOLIS	PREVENT&CONTROL SPILLAGE PESTICIDES FROM AGRICULTURAL OPERATIONS INCLUDING AERIAL&GROUND APPLICATORS	KAZIMIER, H.	80546601	NEW	77/09/26	$125,280
INDIANA UNIV. INDIANAPOLIS	OHIO RIVER BASIN ENERGY STUDY: PHASE II	RANDOLPH, J. C.	80560901	NEW	77/09/22	$30,000
MUNCIE SAN. DIST. MUNCIE	STUDY & ANALYSIS OF THE MUNCIE INDIANA INDUSTRIAL PRETREATMENT PROGRAM	CRADDOCK, J.	80552801	NEW	77/09/14	$72,500
PURDUE RES. FDN. WEST LAFAYETTE	OHIO RIVER BASIN ENERGY STUDY:PHASE II	RAVINDRAN, A.	80560301	NEW	77/09/22	$30,000
PURDUE RESEARCH FDN. WEST LAFAYETTE	SEMI-EMPIRICAL CORRELATIONS FOR AIRCRAFT EXHAUST EMISSIONS & STANDARDS	MELLOR, A. M.	80444301	INCR	77/05/12	$9,687
PURDUE UNIV. W. LAFAYETTE	TOXICITY, INTERACTIONS & METABOLISM OF IMPORTANT PESTICIDES IN MAMMALS	HOLLINGWORTH, R.	80396503	CONT	77/08/15	$68,849
PURDUE UNIV. W. LAFAYETTE	CHARACTERIZATION OF METAL COMPLEXES IN SEWAGE SLUDGE SYSTEMS	SOMMERS, L.	80454702	CONT	77/08/10	$69,039
PURDUE UNIV. WEST LAFAYETTE	REDUCTION OF POLLUTANTS IN MUNICIPAL SEWAGE SLUDGE TO LEVELS CONSISTANT WITH LAND DISPOSAL	YOST, K. J.	80563101	NEW	77/09/22	$136,792
** TRAINING **						
INDIANA TECHNICAL VOCATIONAL COLL INDIANAPOLIS	WATER POLLUTION CONTROL STATE OPERATOR TRNG	GLENN W SAMPLE PRESIDE	00532801	NEW	77/04/20	$30,100
			00532801	INCR	77/05/25	$15,900

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	I N D I A N A					
** TRAINING **						
NOTRE DAME, UNIV. OF NOTRE DAME	GRADUATE TRAINING IN WATER POLLUTION CONTROL	IRVINE, ROBERT L.	90006505	INCR	77/09/12	$20,000
** FELLOWSHIPS **						
BALL STATE UNIV. MUNCIE	M.S./NATURAL RESOURCES/AIR POLLUTION/PART TIME	EDMONDS, R.	91102601	NEW	77/08/03	$1,053
INDIANA, UNIV. OF BLOOMINGTON	M.S./PUBLIC HEALTH-PART TIME	GALLOY, R.	91099401	NEW	77/08/05	$2,392

APPLIC MUNICIPALITY	TITLE	ROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	UNT OF GRANT AWARD
	I O W A					
** RESEARCH **						
AMES, CITY OF AMES	EVALUATION OF AMES SOLID WASTES RESOURCES AND ENERGY RECOVERY	CHANTLAND, A. D.	80390302	INCR	77/06/30	$120,000
IOWA STATE UNIV AMES	METHODS FOR DISPOSAL OF EXCESS PESTICIDES USED BY FARMERS	HALL, C.	80453302	CONT	77/09/20	$162,179
IOWA STATE UNIV. AMES	DEVELOPMENT OF SAFE METHODS FOR DISPOSAL OF EXCESS PESTICIDES USED BY FARMERS & AGRI. APPLICATORS	HALL, C. V.	80453301	INCR	77/08/23	$2,000
IOWA, UNIV. OF OAKDALE	AGRI-MEDICAL CONFERENCE	LONG, K.	80525701	NEW	77/04/26	$12,219
** TRAINING **						
ABC, INC. AMES	EVALUATION OF WATER & WASTEWATER OPERATOR TRAINING COURSE MODULES	CAMPBELL, D.	90071101	NEW	77/09/08	$29,700
IOWA DEPT OF ENVIRONMENTAL QUALITY DES MOINES	WATER AND WASTEWATER TREATMENT PLANT OPERATOR TRAINING	CRANE, LARRY E EXEC DI	00710401	NEW	77/07/06	$7,500
KIRKWOOD COMMUN. COLLEGE CEDAR RAPIDS	OPERATIONAL CONSIDERATIONS FOR WWT PLANT DESIGN	BARDONNER, C.	90074701	NEW	77/09/26	$26,503
KIRKWOOD COMMUNITY COLLEGE CEDAR RAPIDS	GRANT APP TO DEV A CASE ON TRBLSHTNG WTR PLNT OPR	BALLANTYNE, S.A., SUPT	00710601	NEW	77/09/28	$32,988
KIRKWOOD COMMUNITY COLLEGE CEDAR RAPIDS	VIDEOTAPING OF SELECTED WASTEWATER PROCESSING FOR OPERATOR TRAINING	BALLANTYNE, SA, SUPT.	00710701	NEW	77/09/29	$5,128
NATIONAL FIELD RES. CENTER, INC. IOWA CITY	THE NATIONAL ENVIRONMENTAL ENERGY WORKFORCE	ALBRIGHT, DAROLD E.	90059102	INCR	77/07/07	$30,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
		I O W A				
** TRAINING **						
			90059102	CONT	77/05/04	$450,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	K A N S A S					
** RESEARCH **						
KANSAS STATE UNIV. MANHATTAN	DETERMINATION OF KINETICS OF PHOSPHORUS MINERALIZATION IN SOILS UNDER OXIDIZING CONDITIONS	ELLIS, R.	80540301	NEW	77/06/15	$29,408
KANSAS, UNIV. OF LAWRENCE	PESTICIDE USE REDUCTION THROUGH INTEGRATED CONTROL PROCEDURES ON MUSK THISTLE	MARTINKO, E.	80545501	NEW	77/08/19	$69,532
** TRAINING **						
KANSAS, UNIV. OF LAWRENCE	TRAINING GRANT IN WATER SUPPLY & POLLUTION CONTROL	OBRIEN, WALTER J.	90013606	INCR	77/08/29	$13,200
** FELLOWSHIPS **						
KANSAS, UNIV. OF LAWRENCE	M.S./ENVRN. HEALTH ENGR.	MICHAEL, R.	91100901	NEW	77/07/28	$7,569
KANSAS, UNIV. OF LAWRENCE	M.S./ENVRN.-PART TIME	COTTER, J.	91102801	NEW	77/08/02	$1,678

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
K E N T U C K Y						
** RESEARCH **						
KENTUCKY, UNIV. OF LEXINGTON	CHARGED MEMBRANE UF & SULFIDE PRECIPITATION TO TREAT NONFERROUS METAL PRODUCTION WASTES	GRIEVES, ROBERT B.	80456802	CONT	77/08/23	$15,950
KENTUCKY, UNIV. OF LEXINGTON	METABOLISM OF CARBAMATE INSECTICIDES	DOROUGH, H. WYMAN	80514301	NEW	77/05/03	$64,845
KENTUCKY, UNIV. OF LEXINGTON	OHIO RIVER BASIN ENERGY STUDY PROJECT: PHASE II	BLOME,D.	80559001	NEW	77/09/22	$55,000
LOUISVILLE FDN.,INC.,UNIV. OF LOUISVILLE	OHIO RIVER BASIN ENERGY STUDY:PHASE II:IMPACT ASSESSMENT OF ENERGY CONVERSION FACILITIES	SPENCER, HUGH T.	80556901	NEW	77/09/22	$30,000
** DEMONSTRATION **						
KENTUCKY STATE DEPT NATURAL RESOURCES FRANKFORT	USE OF VEGETATIVE FILTER ZONE TO CONTROL FINE GRAINED SEDIMENT FROM SURFACE MINES	FISH, B.	80563201	NEW	77/09/22	$118,666
** TRAINING **						
KENTUCKY DEPT FOR NATURAL RESOURCES FRANKFORT	AIR POLLUTION TRAINING GRANT	JOHN SMITHER	00425501	NEW	77/09/02	$1,452
** FELLOWSHIPS **						
KENTUCKY, UNIV. OF LEXINGTON	M. S./CHEM. ENGR.	CARSON, DAVID G.	91107601	NEW	77/08/05	$7,500

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** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
EAST JEFFERSON WATERWORKS DIST #1 JEFFERSON	GRANULAR ACTIVATED CARBON STUDIES	BRODTMANN, NOEL V.	80457101	INCR	77/04/28	$11,250
GULF SOUTH RES. INST. BATON ROUGE	PREPARE STATE-OF-THE-ART REPORT ON TOXIC SUBSTANCES IN TISSUES	MCKOWN, M.	80534401	NEW	77/06/24	$20,000
GULF SOUTH RES. INST. BATON ROUGE	NOVEL TECHNIQUES FOR CONCENTRATION & SEPARATION OF TOXIC SUBSTANCES FROM ESTUARINE WATERS	KLEIN, E.	80565601	NEW	77/09/23	$49,816
LOUISIANA STATE UNIV. BATON ROUGE	NITROGEN AND PHOSPHORUS REACTIONS IN OVERLAND FLOW IN WASTEWATER	PATRICK, W.	80361202	CONT	77/06/01	$58,899
LOUISIANA STATE UNIV. BATON ROUGE	DETERMINATION OF ENVRN. IMPACT OF SEVERAL SUBSTITUTE CHEMICALS IN AGRICULTURALLY-AFFECTED WETLANDS	DAY, J.	80497602	CONT	77/09/08	$99,250
LOUISIANA STATE UNIV. BATON ROUGE	METHANE & VOLATILE FATTY ACIDS FROM CHEMICALLY TREATED AGRICULTURAL RESIDUES	CALLIHAN, C. D.	80535401	NEW	77/09/27	$49,400
LOUISIANA STATE UNIV. & A&M COLLEGE BATON ROUGE	BEHAVIOR OF DDT&KEPONE IN SEDIMENT-WATER SYSTEMS UNDER DIFFERENT OXIDATION-REDUCTION & PH CONDITIONS	PATRICK,W.	80494002	CONT	77/09/12	$85,416
LOUISIANA TECH UNIV. RUSTON	BEST MGMT. PRACTICES FOR UNCONFINED ANIMAL PRODUCTION	ROBBINS, JACKIE W.	80555901	NEW	77/09/12	$55,930
SOUTHERN UNIV. BATON ROUGE	IDENTIFICATION & QUANTIFICATION OF NONVOLIATE ORGANIC SUBSTANCES IN MUN. WATER SUPPLIES	SMALLEY, ARNOLD	80365002	CONT	77/08/23	$23,831
SOUTHERN UNIV. BATON ROUGE	EFFECTS OF POST-IMPLANTATION EXPOSURE TO PESTICIDES MIREX & KEPONE ON REPRODUCTIVITY OF RATS	SPENCER, F.	80497401	NEW	77/08/23	$40,051

L O U I S I A N A

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
TULANE UNIV. NEW ORLEANS	SURVEY OF WASTE SLUDGES FOR PARASITIC CONTAMINATION IN U.S.	REIMERS, R. S.	80510701	NEW	77/04/22	$88,347
TULANE UNIV. NEW ORLEANS	WATER SOURCES, CHARACTERISTICS & MALIGNANCY RATES OF SELECTED SITES IN SELECTED-PARISHES OF LA	GOTTLIEB, M. S.	80511001	NEW	77/04/28	$139,931
TULANE UNIV. NEW ORLEANS	EPIDEMIOLOGICAL-MICROBIOLOGICAL STUDY OF HEALTH EFFECTS AMONG SWIMMERS AT LAKE PONTCHARTRAIN	KTSANES, V.	80534101	NEW	77/06/22	$60,850
** TRAINING **						
DELGADO COLLEGE NEW ORLEANS	WASTEWATER TREATMENT FACILITY OPERATOR TRAINING PROGRAM	DR. MARVIN E. THAMES,	00613301	NEW	77/05/11	$12,000
LOUISIANA TECH. TRANSFER BATON ROUGE	PROJECT SHOREBIRD	D'AGOSTINO, C.	90069201	NEW	77/08/04	$35,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	M A I N E					
** RESEARCH **						
MAINE STATE DEPT. OF MARINE RESOURCES AUGUSTA	RELATION BETWEEN HYROCARBON CONTAMINATION AND TUMORS IN MYR ARENARIA	DOW, R. L.	80474501	NEW	77/08/19	$100,000
MAINE, UNIV. OF BANGOR	EFFECT OF PARTICULATES IN OZONE DISINFECTION OF BACTERIA & VIRUSES ON WATER	SPROUL, O.	80458702	CONT	77/08/23	$58,555
MAINE, UNIV. OF ORONO	CRITICAL REVIEW OF VIRUS REMOVAL BY COAGULATION AND PH	SPROUL, O.	80539901	NEW	77/06/01	$15,000
** DEMONSTRATION **						
BANGOR, CITY OF BANGOR	FEASIBILITY OF COMPOSTING RAW SEWAGE SLUDGE BY HIGH RATE SUCTION AERATION TECHNIQUES	MISHOW, RALPH	80382801	INCR	77/04/21	$40,570
COBBOSSEE WATERSHED DIST. WINTHROP	COBBOSSEE WATERSHED LAKES RESTORATION PROJECT	GORDON, T.	80545401	NEW	77/08/01	$278,020
MAINE DEPT. OF ENV. PROTECTION AUGUSTA	MAINE STATE SOLID WASTE DEMO GRANT	RONALD C. HOWES	00110901	INCR	77/06/30	$35,000

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** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
CHARLES CNTY, COMMUN, COLLEGE LA PLATA	FIELD STUDY OF NUTRIENT CONTROL IN A MULTI-CELL LAGOON	ENGEL, W.	80363702	CONT	77/05/20	$50,330
CHESAPEAKE RESEARCH CONSORTIUM BALTIMORE	BI STATE CONFERENCE ON THE CHESAPEAKE BAY	WILLIAM J. HARGIS, JR.	00312901	NEW	77/06/14	$10,000
JOHN HOPKINS UNIV. BALTIMORE	BIOLOGICAL EVALUATION ON THE BENEFITS OF MAINTAINING A CHLORINE RESIDUAL IN PULIC WATER SYSTEMS	KRUSE, C.	80430702	CONT	77/05/10	$64,549
JOHNS HOPKINS UNIV. BALTIMORE	ENUMERATION OF SHIGELLA IN POLLUTED WATERS	OLIVIERI, V.	80459602	CONT	77/08/29	$19,440
JOHNS HOPKINS UNIV. BALTIMORE	CHLORINATION OF PUBLIC WATER SUPPLIES AND CANCER	KRUSE, C.	80519801	NEW	77/04/08	$33,602
MARYLAND EASTERN SHORE, UNIV. OF PRINCESS ANNE	VIVO INCORPORATION OF TOXIC ELEMENTS INTO ANIMAL TISSUES	HOPKINS, T.	80517501	NEW	77/07/26	$37,891
			80517501	INCR	77/09/15	$18,315
MARYLAND STATE ENVRN. SERVICE ANNAPOLIS	REFUSE DERIVED FUEL AS A SUPPLEMENTAL FUEL IN CEMENT KILNS	WILLEY C.R.	80561301	NEW	77/09/26	$199,548
MARYLAND, UNIV. OF COLLEGE PARK	ECONOMIC ASPECTS OF EFFECTS UPON HEALTH AND CLIMATE FROM THE MANAGEMENT & CONTROL OF OZONE DEPLETION	CUMBERLAND, J.	80541101	NEW	77/06/07	$197,009
			80541101	INCR	77/08/10	$5,609

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APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
M A R Y L A N D						
** RESEARCH **						
			80541101	INCR	77/09/26	$21,827
MARYLAND, UNIV. OF COLLEGE PARK	A UNITED APPROACH TO MODELLING COMPUTER SERVICES	AGRAWALA, A.	80547801	NEW	77/09/19	$10,074
NATIONAL COUNCIL RADIATION BETHESDA	ASSESSMENT OF RADIATION LEVELS AND HAZARDS	NEY, W. R.	80535901	NEW	77/07/01	$50,000
** DEMONSTRATION **						
BALTIMORE, CITY OF BALTIMORE	LOCH RAVEN RESERVIOR AERATION DEMONSTRATION PROJECT	KUCHTA, F. W.	80489401	NEW	77/04/07	$110,000
** TRAINING **						
CHARLES CNTY. COMMUN. COLLEGE LA PLATA	WATER POLLUTION CONTROL TRAINING	ENGEL, W.	90074001	NEW	77/09/22	$7,000
MARYLAND STATE DEPT. OF HEALTH BALTIMORE	WATER SUPPLY TRAINING PROGRAM	HOLTAN, A.	90073501	NEW	77/09/12	$9,052
MARYLAND, UNIV. OF COLLEGE PARK	FOUR YEAR WATER & WASTEWATER TECHNOLOGY CURRICULUM	AUSTIN, JOHN H.	90066801	INCR	77/09/28	$30,000
** FELLOWSHIPS **						
JOHN HOPKINS UNIV. BALTIMORE	M.S./HEALTH SCIENCE	WILLIAMS, C.	91102901	NEW	77/07/29	$11,612
JOHNS HOPKINS UNIV. BALTIMORE	M.S./ENVRN. ENGR.	WOOD, R.	91091701	INCR	77/08/29	$2,265

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
		M A R Y L A N D				
** FELLOWSHIPS **						
JOHNS HOPKINS UNIV. BALTIMORE	M.A./ENVRN. ENGR./PART TIME	NACE, RICHARD L.	91096801	INCR	77/08/31	$1,070
MARYLAND, UNIV. OF COLLEGE PARK	B.S./WATER RESOURCES MGMT.	SLEEGER, PRESTON A.	91096401	INCR	77/07/21	$1,042
MARYLAND, UNIV. OF COLLEGE PARK	M.S./ENVRN. ENGR./PART TIME	ASNER, J.	91096501	INCR	77/08/15	$1,965
MARYLAND, UNIV. OF COLLEGE PARK	M.S./CHEMICAL ENGR./PART TIME AGENCY	RAMSEY, W.	91096601	INCR	77/09/08	$1,231
MARYLAND, UNIV. OF COLLEGE PARK	M.S./WATER RESOURCES ENGR./FULL TIME AGENCY	WILSON, H.	91111501	NEW	77/09/14	$1,836
MARYLAND, UNIV. OF COLLEGE PARK	M.S./CIVIL ENGR./PART TIME	COVER, C.	91111801	NEW	77/09/19	$1,394
MARYLAND, UNIV. OF COLLEGE PARK	M.S./CIVIL ENGR.	SCHMIDT, TIMOTHY J.	91112801	NEW	77/08/16	$4,200
MARYLAND, UNIV. OF COLLEGE PARK	WATER SUPPLY-FULL TIME AGENCY	HOGAN, T.	91113401	NEW	77/09/14	$1,820

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MASSACHUSETTS						
** RESEARCH **						
BOSTON UNIV. BOSTON	SUBLETHAL EFFECTS OF OIL ON BEHAVIOR & CHEMICAL SENSES OF MARINE ANIMALS	ATEMA, J.	80383303	CONT	77/09/12	$56,886
HARVARD COLLEGE CAMBRIDGE	HIGH VELOCITY FABRIC FILTRATION	FIRST, M.	80470002	CONT	77/07/15	$41,119
HARVARD COLLEGE BOSTON	REVIEW OF CONTROL TECHNOLOGIES FOR OPEN SOURCES OF PARTICULATE EMISSIONS	COOPER, DOUGLAS W.	80529401	NEW	77/06/03	$38,247
HARVARD COLLEGE CAMBRIDGE	EXPOSURE ASSESSMENTS: STATE-OF-THE-ART REVIEW	ZECKHAUSER, R.	80564701	NEW	77/09/19	$13,804
HARVARD UNIV. CAMBRIDGE	ORGANIC N-CHLORO COMPOUNDS IN CHLORINATION OF WATER SUPPLIES-THEIR FORMATION & SIGNIFICANCE	MORRIS, J. CARROLL	80363102	INCR	77/09/20	$18,141
HARVARD UNIV. CAMBRIDGE	ECONOMIC INCENTIVES FOR ENVIRONMENTAL PROTECTION	SCHELLING, T.	80544601	NEW	77/06/30	$250,000
HARVARD UNIV. CAMBRIDGE	THE USE OF MODELS IN ENVRN. DECISION MAKING CONCERNING AIR QUALITY	LYNN, LAURENCE E.	80555801	NEW	77/09/23	$107,445
LOWELL, UNIV. OF LOWELL	NEW AMINE CARBAMATE GELATION TECHNIQUES FOR USE IN OIL SPILL RECOVERY OPERATIONS	BANNISTER, W. W.	80462801	NEW	77/04/22	$28,964
LOWELL, UNIV. OF LOWELL	MONITORING SEPTAGE ADDITION TO WASTEWATER TREATMENT PLANTS	SEGALL, B.	80540601	NEW	77/07/29	$143,692
MASSACHUSETTS GEN. HOSPITAL BOSTON	FOLLOW-UP STUDIES ON MELANOMA PATIENTS FOR EXPOSURE HABITS, SKIN TYPES, ETC.	FITZPATRICK, T.	80554001	NEW	77/09/12	$43,436

M A S S A C H U S E T T S

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MASSACHUSETTS INST OF TECH CAMBRIDGE	COMBUSTION RESEARCH ON COAL NITROGEN AND PARTICULATE ORGANIC MATTER	HOWARD, J. B.	80324203	INCR	77/04/26	$20,000
MASSACHUSETTS INST. OF TECH. CAMBRIDGE	CHEMICAL MODELING OF METALLIC WASTE DISPOSAL	MOREL, F.	80373803	CONT	77/08/19	$30,610
MASSACHUSETTS INST. OF TECH. CAMBRIDGE	CATALYTIC DESULFURIZATION AND DENITROGENATION	SATTERFIELD, CHARLES N	80412303	CONT	77/08/01	$60,060
MASSACHUSETTS INST. OF TECH. CAMBRIDGE	LONG DISTANCE TRANSPORT OF AIR POLLUTANTS	FAY, J. A.	80489101	NEW	77/09/27	$53,157
MASSACHUSETTS INST. OF TECH. CAMBRIDGE	NO EMMISSION FROM FLUIDIZED COMBUSTION	BEER, J.	80497802	CONT	77/07/15	$150,000
MASSACHUSETTS INST. OF TECH. CAMBRIDGE	TREATMENT OF GASEOUS EMISSIONS FROM STEELPLANTS CONTAINING SMALL CONCENTRATIONS OF HYDROCARBON VAPOR	SZEKELY, J.	80531101	NEW	77/06/15	$10,000
MASSACHUSETTS INST. OF TECH. CAMBRIDGE	KINETICS OF EVOLUTION OF SULFUR-BEARING GASES FROM BLAST FURNACE SLAGS	ELLIOTT, J.	80533801	NEW	77/06/13	$12,100
MASSACHUSETTS INST. OF TECH. CAMBRIDGE	REDUCTION OF POLLUTANT FORMATION IN COAL PARTICLE AND LIQUID FUEL SPRAY FLAMES	BEER, JANOS M.	80555201	NEW	77/09/12	$200,789
MASSACHUSETTS, UNIV OF AMHERST	EVALUATION OF NATURAL INHIBITING FACTORS IN AGGRESSIVE DRINKING WATER SUPPLY	ZAJICEK, O.	80563801	NEW	77/09/20	$31,386
MASSACHUSETTS, UNIV. OF AMHERST	LOW WASTEWATER POTATO STARCH /PROTEIN PRODUCTION PROCESS	ROSENAU, J.	80371203	CONT	77/06/22	$21,300

M A S S A C H U S E T T S

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
MASSACHUSETTS, UNIV. OF N. WORCESTER	DETECTION OF VIRAL GASTROENTERITIS AGENTS	BLACKLOW, N.	80516901	NEW	77/04/08	$48,525
MASSACHUSETTS, UNIV. OF AMHERST	INTERNATIONAL CONFERENCE ON THE EFFECT OF POLLUTANTS ON HIGH RISK GROUPS	CALABRESE, E.	80524401	NEW	77/06/01	$24,145
MASSACHUSETTS, UNIV. OF AMHERST	EFFECT CHLORINE DIOXIDE & CHLORINE DIOXIDE PLUS NITRITES ON MICE WITH LOW G-6-PD ACTIVITY	MOORE, GARY S.	80555701	NEW	77/09/26	$52,479
META SYSTEMS INC CAMBRIDGE	NEW RESIDENTIAL DEVELOPMENTS & THE QUANTITY & QUALITY OF RUNOFF	LUECKE, DANIEL F.	80523801	NEW	77/06/15	$52,117
META SYSTEMS INC. CAMBRIDGE	WATER QUALITY IMPACT AND SOCIO-ECONOMIC ASPECTS OF REDUCING NONPOINT SOURCE POLLUTION FROM AGRIC.	BURDEN, R. P.	80503601	NEW	77/06/30	$61,866
NEW ENGLAND FISHERIES STEERING COMM. NEW BEDFORD	ELECTROCHEMICAL COAGULATION STUDY FOR FISH PROCESSING WASTEWATER	NICKERSON, H.	80549301	NEW	77/09/08	$48,045
WHEATON COLLEGE NORTON	SKELETAL VARIANTS AS AN INDICATOR OF BIOLOGICAL EFFECTS OF ENVRN. CONTAMINANTS	BECK, S.	80542001	NEW	77/08/23	$44,414
** DEMONSTRATION **						
BILLERICA, TOWN OF BILLERICA	RESTORATION OF WATER QUALITY IN NUTTING LAKE THROUGH NUTRIENT MGMT & CONTROL	KING, FREDERIC	80502801	NEW	77/05/12	$166,211
MASS. BUREAU OF SOLID WASTE DISPOSAL BOSTON	SOLID WASTE DEMONSTRATION	ALDEN E. COUSINS	00104601	INCR	77/09/30	$85,000
REED & BARTON SILVERSMITHS TAUNTON	JOINT TREATMENT OF MULTI-COMPANY PLATING WASTES	GILL, H. G.	80518101	NEW	77/04/21	$30,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	M A S S A C H U S E T T S					
** DEMONSTRATION **						
WOODS HOLE OCEANOGRAPHIC INST. WOODS HOLE	CAPE COD WASTE WATER RENOVATION AND RETRIEVAL SYSTEM	VACCARO, R.	80203702	INCR	77/05/20	$100,000
** TRAINING **						
ACTION FOR BOSTON COMM. DEV., INC. BOSTON	DEVELOPMENT OF USABLE GUIDEBOOK FOR PLANNING & OPERATING ENVRN. PROGRAMS FOR YOUTH	COARD, ROBERT M.	90070301	NEW	77/09/06	$15,000
BOSTON COLLEGE WESTON OBSERVATORY WESTON	STATE STAFF EDUCATION & TRAINING PROVIDES SUPPORT TO STATES FOR STAFF IMPROVEMENT & UPGRADING	RIDER, THEODORE	00116201	NEW	77/09/30	$25,000
HARVARD UNIV. BOSTON	GRADUATE TRAINING IN AIR POLLUTION	MOELLER, D.	90068101	NEW	77/07/25	$30,000
N.E. WATER POLL. CONTROL ASSN. INC. NE WPC ASSN, INC	TO TRAIN WWT PLANT MAINT. & OPERATION PERSONNEL	EDWARD KOWSZ, PRESIDEN	00115201	NEW	77/09/09	$33,065
NEW ENGLAND CONSORTIUM ENVRN. PROTECT WESTON	NEW ENGLAND CONSORTIUM ON ENVRN. PROTECTION	RIDER, T.	90065501	NEW	77/07/14	$49,972
NORTHEASTERN UNIV. BOSTON	TRAINING IN WATER QUALITY ENGR.	COCHRANE, J.	90018004	INCR	77/09/12	$24,500
TUFTS UNIV. MEDFORD	GRADUATE TRAINING FOR ENVRN. ENGR.	HANES, N. BRUCE	90015208	INCR	77/08/30	$46,800
** FELLOWSHIPS *						
BOSTON COLLEGE NEWTON	J.D./ENVRN. REGULATION/LAW	RODRIGUEZ, R.	91108301	NEW	77/09/14	$9,100

M A S S A C H U S E T T S

** FELLOWSHIPS **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
BRIDGEWATER STATE COLLEGE BRIDGEWATER	B.A./EARTH SCIENCES	WINKLER, J.	91104801	NEW	77/08/02	$3,195
HARVARD UNIV. BOSTON	M. S./BIOSTATISTICS	BERGER, R.	91100001	NEW	77/08/04	$7,345
HARVARD UNIV. CAMBRIDGE	PH.D./SAN. ENGR.	ISAAC, R.	91101601	NEW	77/07/20	$4,200
HARVARD UNIV. CAMBRIDGE	M.S./ENVRN. HEALTH	CARSON, S.	91102501	NEW	77/07/29	$7,250
HARVARD UNIV. BOSTON	M.S./ENVRN. HEALTH SCIENCES	SILVERSTRONE, J.	91104601	NEW	77/07/29	$8,965
HARVARD UNIV. BOSTON	M. S./AIR POLLUTION CONTROL	MCCARTHY, J.	91105001	NEW	77/08/01	$8,150
HARVARD UNIV. CAMBRIDGE	M.S./CITY & REG. PLANNING	LOEWENTHAL, SHARON P.	91105801	NEW	77/08/04	$7,305
HARVARD UNIV. BOSTON	PH.D/ENVRN. HEALTH SCIENCE	COLOME, S.	91109801	NEW	77/08/16	$5,380
MASSACHUSETTS INST. OF TECH. CAMBRIDGE	M.S./ENVRN. ENGR.	ZIEVE, P.	91099301	NEW	77/08/22	$9,936
NORTHEASTERN UNIV. BOSTON	M.S./CIVIL ENGR. ENVRN.	BOISSELLE, HUBERT A.	91030101	INCR	77/07/21	$119

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	M A S S A C H U S E T T S					
** FELLOWSHIPS **						
NORTHEASTERN UNIV. BOSTON	M.S./SAN. ENGR.	CHRETIEN, R.	91086401	INCR	77/09/20	$1,360
NORTHEASTERN UNIV. BOSTON	M.S./CHEMISTRY/PART TIME AGENCY	PAWLOWSKI, E. J.	91087101	INCR	77/09/06	$1,488
NORTHEASTERN UNIV. BOSTON	M.S./SAN. ENGR.	PARE, M. K.	91098601	NEW	77/09/15	$2,105
NORTHEASTERN UNIV. BOSTON	M. S./PUBLIC ADMIN.	TRINGALE, D. A.	91109501	NEW	77/08/10	$8,825
TUFTS UNIV. MEDFORD	M.S./URBAN, SOCIAL & ENVRN. POLICY	NEWLANDS, ELLEN J.	91087901	INCR	77/09/12	$3,175

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** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
CRANBROOK INST. OF SCIENCE BLOOMFIELD HILLS	SURVEY OF NUTRIENTS & HAZARDOUS SUBSTANCES IN SAGINAW BAY	BOWEN, ROBERT	80444201	INCR	77/04/26	$17,661
CRANBROOK INST. OF SCIENCE BLOOMFIELD HILLS	SURVEY OF NUTRIENTS & HAZARDOUS MATERIALS IN SAGINAW BAY	SMITH, VAN ELLIOT	80444202	CONT	77/05/10	$150,596
HAZARDOUS MATERIALS CONTROL RES. INST. SOUTHFIELD	THE 1978 NATIONAL CONFERENCE ON CONTROL OF HAZARDOUS MATERIAL SPILLS	USHER, D.	80522301	NEW	77/05/10	$25,000
MICHIGAN STATE UNIV. EAST LANSING	UTILIZATION OF PEST ECOSYSTEM MODELS IN PEST MANAGEMENT PROGRAMS	HOFFMAN, J.	80378503	CONT	77/05/12	$77,589
MICHIGAN STATE UNIV. EAST LANSING	DEVELOPMENT OF MANAGEMENT MODELS FOR STREAM ECOSYSTEMS	BOLING, R.H.	80442401	INCR	77/09/12	$50,000
MICHIGAN STATE UNIV. EAST LANSING	EVALUATION OF DREDGING AS A LAKE RESTORATION TECHNIQUE	MCNABB, CLARENCE D.	80504601	NEW	77/09/06	$211,913
MICHIGAN STATE UNIV. EAST LANSING	SOIL & CROP MGMT SYSTEMS FOR TREATMENT, UTILIZATION & DISPOSAL OF MUNICIPAL WW & SLUDGES	ERICKSON, A. E.	80527001	NEW	77/05/10	$133,050
MICHIGAN STATE UNIV. EAST LANSING	ECOSYSTEM RESPONSES TO ALTERNATIVE PESTICIDES IN THE TERRESTRIAL ENVIRONMENT: A SYSTEMS APPROACH	GOODMAN, I.	80562401	NEW	77/09/09	$116,119
MICHIGAN, UNIV. OF ANN ARBOR	WATER QUALITY STUDIES ON RIVER NILE AND LAKE NASSER	MANCY, K.	80329104	CONT	77/08/30	$20,000
MICHIGAN, UNIV. OF ANN ARBOR	OPTIMAL SAMPLING STRATEGIES FOR WATER QUALITY IN LARGE LAKES	CANALE, R.	80375402	INCR	77/06/22	$14,993

MICHIGAN

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MICHIGAN, UNIV. OF ANN ARBOR	EFFECTIVENESS ACTIVATED CARBON FOR REMOVAL OF TOXIC &/OR CARCINOGENIC COMPONENTS FROM DRINKING WATER	WEBER, W.	80436902	CONT	77/08/10	$99,158
MICHIGAN, UNIV. OF ANN ARBOR	NUTRIENT AND PLANKTON RELATIONSHIPS IN NORTHERN LAKE MICHIGAN	SCHELSKE, C. L.	80450301	INCR	77/04/26	$153,000
MICHIGAN, UNIV. OF ANN ARBOR	CHEMICAL AMPLIFIERS AS ODD HYDROGEN RADICAL DETECTORS	STEDMAN, D.	80460701	INCR	77/08/29	$8,858
MICHIGAN, UNIV. OF ANN ARBOR	GUIDE TO CRUSTACEAN ZOOPLANKTON OF THE GREAT LAKES	GANNON, J.	80465201	INCR	77/04/08	$25,500
MICHIGAN, UNIV. OF ANN ARBOR	RATES OF ACCUMULATION OF POTENTIALLY HAZARDOUS SUBSTANCES IN RECENT SEDIMENTS OF LAKE HURON	ROBBINS, J.A.	80468602	CONT	77/09/22	$60,198
MICHIGAN, UNIV. OF ANN ARBOR	ASSESSMENT OF THE PRESENT STATUS OF BENTHIC MICRO-INVERTEBRATES IN LAKE MICHIGAN	MOZLEY, S.	80533301	NEW	77/07/06	$75,345
MICHIGAN, UNIV. OF ANN ARBOR	DEVELOPMENT OF AN VITRO NEUROTOXICITY ASSAY	RICHARDSON, R.	80533901	NEW	77/07/01	$56,943
NATIONAL SANITATION FDN. ANN ARBOR	4TH NATIONAL CONFERENCE ON INDIVIDUAL ONSITE WW SYSTEMS	MCCLELLAND, N. T.	80553801	NEW	77/09/02	$10,000
STATE OF MICHIGAN DNR LANSING	NORTH GREEN BAY WATER STUDY	HOWARD A TANNER DIRECT	00533101	NEW	77/07/28	$81,536
THE UNIVERSITY OF MICHIGAN ANN ARBOR	GREAT LAKES POLLUTION CONTROL	CHARLES G OVERBERGER V	00533701	NEW	77/09/12	$32,244

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APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
THE UNIVERSITY OF MICHIGAN ANN ARBOR	GREAT LAKES POLLUTION CONTROL	C W MATTHEWS CONTROLLE	00534001	NEW	77/09/30	$61,909
** DEMONSTRATION **						
EAST GRAND RAPIDS, CITY OF GRAND RAPIDS	REEDS LAKE RESTORATION PROJECT	THOLEN, F. H.	80470801	NEW	77/06/22	$903,452
FORD MOTOR CO. DEARBORN	ELECTROLYTIC TREATMENT OF OILY WASTEWATER	GEALER, R.	80417402	CONT	77/06/30	$43,000
INGHAM CNTY. BD. OF COMM. MASON	LAKE LANSING DREDGING & RESTORATION	SODE, RICHARD	80423201	INCR	77/05/12	$455,957
** TRAINING **						
MICHIGAN STATE DEPT OF PUBLIC HEALTH LANSING	WATER SUPPLY STATE AGENCY TRAINING GRANT/ FELLOWSHIP FOR STATE AGENCY EMPLOYEES	KELLEY, W.	90071901	NEW	77/09/12	$5,200
MICHIGAN STATE UNIV. EAST LANSING	DEVELOP INSTRUCTORS GUIDE FOR HOME STUDY/ SUPERVISORY MGMT IN THE WATER/WASTEWATER FIELD	DEHAVEN, C.	90075101	NEW	77/09/27	$15,595
** FELLOWSHIPS **						
MICHIGAN, UNIV. OF ANN ARBOR	M.S./AIR POLLUTION CONTROL	SLACK, D.	91099801	NEW	77/07/28	$8,525

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** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
ENVIRONMENTAL RESEARCH INST. OF MI. ANN ARBOR	CLADOPHORA MEASUREMENTS USING REMOTE SENSING	WEZERNAK, CHESTER T.	80361101	INCR	77/05/10	$3,980
MINNESOTA STATE DEPT OF HEALTH MINNEAPOLIS	HEALTH IMPACT STUDIES OF MINERAL FIBERS IN THE DULUTH MUN. WATER SUPPLY	LAWSON, W.	80542801	NEW	77/09/30	$81,514
MINNESOTA, UNIV. OF MINNEAPOLIS	DEVELOPMENT OF BASIC AEROSOL STANDARDS	LIU, BENJAMIN Y.H.	80130105	INCR	77/05/02	$15,000
MINNESOTA, UNIV. OF MINNEAPOLIS	EFFECT OF CYANIDE ON FRESHWATER FISH & INVERTEBRATES	SMITH, LLOYD L.	80291403	INCR	77/04/12	$79,828
			80291403	INCR	77/09/30	$52,000
MINNESOTA, UNIV. OF ST. PAUL	FORMATION OF ATMOSPHERIC AEROSOLS	WHITBY, K.	80385103	CONT	77/04/12	$151,174
			80385103	INCR	77/09/15	$54,420
MINNESOTA, UNIV. OF ST. PAUL	CONTINUOUS FLOW BIOASSAYS USING NATURAL PERIPHYTON COMMUNITIES WITH EMPHASIS ON THE EFFECTS OF COAL	GERHART, D.	80393203	CONT	77/06/09	$55,369
MINNESOTA, UNIV. OF ST. PAUL	ORGANIC LEACHING AND PARTICULATE DISPERSION FROM COAL	CAPLE , R.	80395203	CONT	77/06/17	$170,000
			80395203	INCR	77/08/10	$10,000

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APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
MINNESOTA, UNIV. OF ST. PAUL	OPTICAL DETECTION OF ASBESTIFORM FIBERS IN FINISHED DULUTH DRINKING WATER	SYDOR, M	80436102	CONT	77/04/22	$57,000
MINNESOTA, UNIV. OF ST. PAUL	DEVELOPMENT OF CHRONOEPIDEMIOLOGIC METHODS WITH REFERENCE TO CARDIOPULMONARY CONDITIONS	HALBERG, F.	80451202	CONT	77/05/12	$51,707
MINNESOTA, UNIV. OF MINNEAPOLIS	RESEARCH ON AIR SAMPLING FILTER MEDIA	LIU, B.	80460002	CONT	77/08/29	$50,000
MINNESOTA, UNIV. OF MINNEAPOLIS	RENEWAL OF WATER TEMPERATURE STUDIES AT THE USEPA MONTICELLO FIELD STATION	STEFAN, H.	80473601	INCR	77/09/12	$13,952
MINNESOTA, UNIV. OF ST. PAUL	STRUCTURE ACTIVITY CORRELATION STUDIES	MAGNUSON, V.	80495302	CONT	77/09/06	$70,000
MINNESOTA, UNIV. OF ST. PAUL	GENERALIZATION OF WATER QUALITY CRITERIA USING CHEMCIAL MODELS	HARRISS, D.	80499602	CONT	77/09/15	$61,317
MINNESOTA, UNIV. OF MINNEAPOLIS	ATMOSPHERIC INPUT OF TRACE METALS TO LAKE MICHIGAN	EISENREICH, S.	80517201	NEW	77/04/07	$21,409
MINNESOTA, UNIV. OF ST. PAUL	DEVELOP & TEST AN AUTOMATIC FISH TRACKING & MONITORING SYSTEM FOR MONTICELLO ECOLOGICAL RES. STATION	KUECHLE, V.	80529001	NEW	77/06/15	$84,913
MINNESOTA, UNIV. OF ST. PAUL	INFLUENCE OF EXTERNAL FACTORS OF TOXICITY OF IRON AND COPPER CYANIDE FORMS	SMITH, L.	80529101	NEW	77/06/20	$31,544
** DEMONSTRATION **						
ST. PAUL METRO. WASTE CONTROL COMM ST. PAUL	PROCESS AUTOMATION EVALUATION	POLTA, R.	80360203	CONT	77/06/09	$89,554

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	M I N N E S O T A					
** TRAINING **						
MINNESOTA, UNIV. OF MINNEAPOLIS	GRADUATE TRAINING IN AIR POLLUTION	PAULUS, H.	90067601	NEW	77/07/27	$30,000
** FELLOWSHIPS **						
MINNESOTA, UNIV. OF MINNEAPOLIS	M.S./PUBLIC HEALTH/FULL TIME AGENCY	LOKEN, LON C.	91082601	INCR	77/09/12	$68
MINNESOTA, UNIV. OF MINNEAPOLIS	M.S./ENVRN. HEALTH-FULL TIME	BOOLE, G.	91093801	INCR	77/08/23	$53
MINNESOTA, UNIV. OF MINNEAPOLIS	M.S./ENVRN. HEALTH	RYDELL, C. D.	91099101	NEW	77/07/27	$10,050
MINNESOTA, UNIV. OF MINNEAPOLIS	M.S./PUBLIC HEALTH-FULL TIME	VOITA, M.	91100101	NEW	77/08/05	$8,286
MINNESOTA, UNIV. OF MINNEAPOLIS	B. S./ENVRN. TECHNOLOGY	LOCKLEY, F.	91100201	NEW	77/08/15	$2,199
MINNESOTA, UNIV. OF MINNEAPOLIS	M.S./ENVRN. HEALTH-FULL TIME	MACKEY, S.	91104001	NEW	77/08/03	$5,695
MINNESOTA, UNIV. OF MINNEAPOLIS	HEALTH SCI.	BENSON, D.	91114501	NEW	77/09/12	$4,200

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	M I S S I S S I P P I					
** RESEARCH **						
CLINTON, CITY OF CLINTON	LAGOON EFFLUENT POLISHING USING PHASE ISOLATION PONDS	MCGRIFF, C.	80529601	NEW	77/08/10	$65,000
			80529601	INCR	77/09/20	$24,014
JACKSON STATE UNIV. JACKSON	IN VIVO INCORPORATION OF TOXIC ELEMENTS INTO PLANTS TISSUE	SHORE, F.	80532101	NEW	77/07/28	$45,000
			80532101	INCR	77/09/12	$21,288
SOUTHERN MISSISSIPPI, UNIV. OF HATTIESBURG	EFFECTS OF PETROLEUM COMPOUNDS ON ESTUARINE FISHES	MARTIN, BILLY J.	80452701	INCR	77/06/03	$25,000
** TRAINING **						
MISSISSIPPI STATE BD OF HEALTH JACKSON	WATER SUPPLY STATE AGENCY TRAINING GRANT	MITCHELL, D.	90074501	NEW	77/09/19	$10,400
MISSISSIPPI STATE UNIV. MISSISSIPPI STAT	SCIENCE & PRACTICE OF WATER POLLUTION CONTROL	SHINDALA, ADNAN	90031405	INCR	77/08/31	$18,900
THE NORTHEAST MISS. JR. COLLEGE BOONEVILLE	MANPOWER TRAINING DEVELOPMENT GRANT	HAROLD T. WHITE	00425377	NEW	77/08/25	$4,500
** FELLOWSHIPS **						
MISSISSIPPI, UNIV. OF UNIVERSITY	M.S./AQUATIC BIOLOGY/FULL TIME AGENCY	WHITTINGTON, DARRYAIL	91098501	NEW	77/08/19	$1,052

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** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MISSOURI, UNIV. OF COLUMBIA	BIOLOGICALLY MEDIATED CORROSION & DETERIORATION OF WATER QUALITY IN WATER DISTRIBUTION SYSTEMS	O'CONNOR, J.	80444402	CONT	77/04/11	$61,140
MISSOURI, UNIV. OF COLUMBIA	REMOVAL OF VIRUS FROM PUBLIC WATER SUPPLIES	OCONNOR, J.	80490302	CONT	77/09/14	$279,375
MISSOURI, UNIV. OF COLUMBIA	STUDY OF CANCER AND THE PULIC DRINKING WATER SUPPLIES OF MISSOURI	MARIENFELD, C.	80529701	NEW	77/07/06	$155,095
MISSOURI, UNIV. OF COLUMBIA	DEVELOPMENT OF PEST MANAGEMENT STRATEGIES FOR SOIL INSECTS ON CORN	FAIRCHILD, MAHLON L.	80542901	NEW	77/09/12	$325,000
MISSOURI, UNIV. OF ROLLA	HEALTH IMPACTS OF ACID MINE DRAINAGE ON DRINKING WATER SUPPLIES IN WESTERN COALS	WIXSON, B.	80557901	NEW	77/09/27	$157,811
WASHINGTON UNIV. ST. LOUIS	SULFUR BUDGET IN LARGE PLUMES	HUSAR, R. B.	80389602	INCR	77/09/15	$6,000
WASHINGTON UNIV. ST. LOUIS	SULFUR BUDGET IN LARGE PLUMES	HUSAR, R. B.	80389603	CONT	77/04/11	$229,941
WASHINGTON UNIV. ST. LOUIS	STUDIES IMPROVE RELIABILITY&SENSITIVITY OF BACTERIAL MUTAGENESIS AS SCREEN FOR ENVRN. CARCINOGENS	COMMONER, BARRY	80439502	CONT	77/06/30	$164,985
WASHINGTON UNIVERSITY ST. LOUIS	A SYSTEM FOR ON-LINE MEASUREMENT OF AEROSOL SIZE DISTRIBUTION, MASS AND SULFUR CONTENT	MACIAS, EDWARD	80311503	INCR	77/07/28	$50,000
WASHINGTON UNIVERSITY ST. LOUIS	INTERNATIONAL SYMPOSIUM ON SULPHUR IN THE ATMOSPHERE	HUSAR, RUDOLF B.	80504301	INCR	77/07/29	$25,000

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APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** TRAINING **						
DEPARTMENT OF NATURAL RESOURCES JEFFERSON CITY	WASTEWATER OPERATOR TRAINING PROGRAM	ASHFORD, CAROLYN, DIRE	00705301	INCR	77/08/25	$7,000
MISSOURI, UNIV. OF COLUMBIA	TRAINING IN WATER SUPPLY & POLLUTION CONTROL	GRIGOROPOULOS, S.	90012104	INCR	77/09/08	$17,000
ST. LOUIS REGIONAL COMMERCE ST. LOUIS	FIRST NATIONAL INDUSTRIAL WASTE EXCHANGE SEMINAR	BAEBLER, A.	90069701	NEW	77/06/02	$4,000
WATER & WASTEWATER TECH. SCH. NEOSHO	TRI-SERVICES MANUAL-"OPERATION&MAINTENANCE OF DOMESTIC INDUSTRIAL WW SYS."&TRAINING COURSE EVAL.	LAYTON, RONALD F.	90070101	NEW	77/09/12	$70,000
WATER WASTEWATER TECH. SCH. NEOSHO	EVALUATION, OPERATIONS & MAINTENANCE TRAINING FOR WW SYSTEMS IN THE U.S. NATIONAL PARKS	LAYTON, RONALD F.	90070201	NEW	77/09/14	$37,431
** FELLOWSHIPS **						
MISSOURI SOUTHERN STATE COLLEGE JOPLIN	B.S./ENVRN. ENGR.	CABRERA, E.	91113301	NEW	77/09/02	$4,200
MISSOURI, UNIV. OF COLUMBIA	M.S./CHEMICAL ENGR.-FULL TIME	SCHREIBER, R.	91100701	NEW	77/08/01	$7,717
WASHINGTON UNIV. ST. LOUIS	M.S./AIR POLLUTION	PATTERSON, D.	91058101	INCR	77/09/12	$1,896
WASHINGTON UNIV. ST. LOUIS	M.S./CHEMISTRY/FULL TIME AGENCY	SAVAGE, ALLEN L.	91071801	INCR	77/04/01	$108

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** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
MONTANA COLLEGE OF MINERAL SCIENCE BUTTE	INVESTIGATION OF NEW TECHNIQUES FOR CONTROL OF SMELTER ARSENIC FLUE DUST WASTES	GALE, G. D.	80459501	INCR	77/05/02	$45,000
MONTANA DEPT OF HEALTH & E. S. HELENA	AIR & WATER QUALITY STUDIES IN MONTANA	A. C. KNIGHT, MD, DIRE	00811503	CONT	77/09/30	$76,000
MONTANA ENERGY OFFICE HELENA	ONS IN NE MONT PRIOR TO IMPACTS FROM COAL PLANT	WILLIAM CHRISTIANSEN,	00818701	INCR	77/09/28	$1,128
MONTANA STATE UNIV. BOZEMAN	EFFECTS OF SURFACE CONFIGURATION IN WPC ON SEMI-ARID MINED LANDS	JENSEN, B.	80307904	CONT	77/09/13	$129,005
MONTANA STATE UNIV. BOZEMAN	COOP. PROGRAM TO EVALUATE SURFACE & GROUND WATER PROBLEMS ASSOCIATED WITH POTENTIAL STRIP MINE SITES	WILLIAMS, T.	80372703	CONT	77/07/13	$482,038
MONTANA STATE UNIV. BOZEMAN	TRANSPORT WATER CONTAMINATION IN COAL SLURRY PIPELINES	PEAVY, H. S.	80517601	NEW	77/05/12	$80,000
MONTANA STATE UNIV. BOZEMAN	DEVELOP IMPROVED ENUMERATION METHODS BASED PHYSIOLOGICAL STUDIES OF INDICATOR BACTERIA DEBILITATION	STUART, D.	80523001	NEW	77/09/29	$52,000
MONTANA STATE UNIV. BOZEMAN	USE OF LICHENS AS INDICATORS AND PREDICTORS OF AIR POLLUTION	EVERSMAN, SHARON	80536701	NEW	77/07/28	$13,604
MONTANA STATE UNIV. BOZEMAN	DEVELOPMENTAL EVALUATION OF RAPID MICROBIAL BIOASSAYS FOR AQUATIC HERBICIDES,PESTICIDES&HEAVY METAL	MCFETERS, GORDON	80538301	NEW	77/06/28	$50,000
MONTANA STATE UNIV. BOZEMAN	MONITORING PLANT COMMUNITY CHANGES DUE TO FOSSIL FUEL POWER PLANTS IN EASTERN MONTANA	TAYLOR, JOHN E.	80539101	NEW	77/06/24	$52,766

M O N T A N A

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
MONTANA STATE UNIV. BOZEMAN	AMMONIA TOXICITY TO FISHES	THURSTON, R.V.	80563601	NEW	77/09/12	$50,000
MONTANA TECH. ALUMNI. FDN. BUTTE	INVESTIGATION OF NEW TECHNIQUES FOR CONTROL OF SMELTER ARSENIC BEARING WASTE	MEHTA, ANIL	80459502	CONT	77/09/14	$133,952
NORTHERN CHEYENNE TRIBAL COUNCIL LAME DEER	POTENTIAL IMPACTS TO GROUND-WATER &SURFACE-WATER QUALITY & QUANTITY FROM PROPOSED ENERGY DEVELOPMENT	MONTEAU, R.	80356603	CONT	77/06/14	$176,785
			80356603	INCR	77/09/12	$15,000
** DEMONSTRATION **						
MONTANA DEPT. OF HEALTH & ENVIR. SCI. HELENA	MONTANA SOLID WASTE MANAGEMENT, ENERGY CONSERVATION & RESOURCE RECOVERY GRANT	A. C. KNIGHT, ACTING D	00816401	INCR	77/06/30	$45,000
** TRAINING **						
MONTANA DEPT OF HEALTH HELENA	TRAIN WATER SUPPLY OPERATOR, MGR. & CITY OFFICIALS OF FEDERAL & STATE REGULATIONS	ARTHUR CLARKSON, CHIEF	00820001	NEW	77/09/30	$8,333
MONTANA STATE DEPT HEALTH & ENVRN. SCI HELENA	PUBLIC WATER SUPPLY PROGRAM	CLARKSON, A.	90072201	NEW	77/09/08	$5,200
** FELLOWSHIPS **						
MONTANA STATE UNIV. MISSOULA	M.S./BIOLOGY	REGELE, S.	91115301	NEW	77/09/23	$3,614

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	N E B R A S K A					
** RESEARCH **						
NEBRASKA, UNIV, OF LINCOLN	DEVELOP MANUAL ON ALTERNATIVE IRRIGATION MGMT PRACTICES & EFFECTS ON ENVRN, IN CENTRAL PARK	TWESKY, M.	80524901	NEW	77/05/20	$78,382
** TRAINING **						
NEBRASKA DEPT OF ENV CONTROL LINCOLN	OPERATOR TRAING ASSISTANCE PROGRAM	DRAIN, DAN T, DIRECTOR	00710501	NEW	77/09/26	$7,500
NEBRASKA STATE DEPT. OF HEALTH LINCOLN	WATER SUPPLY TRAINING	SMITH, H.	90073601	NEW	77/09/09	$5,200
** FELLOWSHIPS **						
NEBRASKA, UNIV, OF LINCOLN	PH.D/ENVRN, LAW	DAVIS, P.	91113101	NEW	77/08/29	$3,215

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
		N E V A D A				
** DEMONSTRATION **						
NEVADA DEPT OF HUMAN RESOURCES CARSON CITY	IMPLEMENTATION OF NV SOLID WASTE PLAN	M LAVERNE RUSSE	00913401	INCR	77/09/28	$12,000
			00913401	INCR	77/05/23	$25,000
** TRAINING **						
CLARK CO. SANITATION DIST. #1 LAS VEGAS	WASTEWATER OPERATORS TRAINING PROGRAM	JAMES WREN-JARVIS	00914201	NEW	77/09/16	$10,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	N E W H A M P S H I R E					
** RESEARCH **						
MANCHESTER, CITY OF MANCHESTER	INVESTIGATION OF A FLUID BED CARBON REGENERATION SYSTEM OF MANCHESTER, NH	KITTREDGE, DAVID	80537101	NEW	77/07/28	$451,800
NEW HAMPSHIRE, UNIV. OF DURHAM	VIRUS CARRIAGE STATUS IN THE HARD SHELL CLAM	METCALF, T. G.	80488201	INCR	77/09/14	$35,814
** DEMONSTRATION **						
N.H. DEPT. OF HEALTH & WELFARE CONCORD	SOLID & HAZARDOUS WASTE PRGM	MAYNARD H MIRES MD	00111701	INCR	77/07/28	$16,425
** TRAINING **						
NEW HAMPSHIRE WATER SUPPLY & PC COMM. CONCORD	TRAINING PROGRAM-NH WATER SUPPLY & POLLUTION CONTROL COMMISSION STAFF	LEAVENWORTH, S. M.	90071701	NEW	77/09/12	$5,200

N E W   J E R S E Y

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
NEW JERSEY DEPT. OF ENVRN. PROTECTION TRENTON	SURVEY OF THE USE & EMISSION OF SELECTED CARCINOGENS IN NEW JERSEY	PREUSS, P.	80550101	NEW	77/09/27	$55,000
NEW JERSEY DEPT. OF ENVRN. PROTECTION TRENTON	RELATIONSHIP BETWEEN CANCER MORTALITY AND POPULATION EXPOSURE TO ENVRN. FACTORS	PREUSS, P.	80552601	NEW	77/09/26	$73,100
NEW JERSEY INST. OF TECH. NEWARK	POLISHING OF INDUSTRIAL WASTE STREAM EFFLUENTS UTILIZING INEXPENSIVE FLY-ASH CLAY ABSORBENT COMBINAT	LISKOWITZ, J.	80566601	NEW	77/09/12	$40,000
PRINCETON UNIV. PRINCETON	USE OF SIMULATION FOR CHARACTERIZING TRANSPORT IN SOILS ADJACENT TO LAND DISPOSAL SITES	PINDER, GEORGE F.	80382702	INCR	77/06/09	$14,295
RUTGERS STATE UNIV. NEW BRUNSWICK	THE SOURCES OF HALOGENATED MATERIALS IN AN URBANIZED WATER SUPPLY	HUNTER, J.	80439402	CONT	77/06/27	$32,702
RUTGERS UNIV./COOK COLLEGE NEW BRUNSWICK	STUDY OF VEGETATION PROBLEMS ASSOCIATED WITH REFUSE LANDFILLS	FLOWER, F. B.	80376202	INCR	77/04/22	$38,783
RUTGERS UNIVERSITY NEW BRUNSWICK	REVIEW AND ANALYSIS OF OIL/WATER SEPARATION LITERATURE	AHLERT, ROBERT C.	80397801	INCR	77/07/28	$4,915
RUTGERS UNIVERSITY NEW BRUNSWICK	DESORPTION & RECOVERY OF BACTERIA FROM SEDIMENT & PARTICULATE MATTER IN THE OCEAN	LITCHFIELD, CAROL D.	80486502	CONT	77/09/20	$31,337
** DEMONSTRATION **						
E. I. DUPONT DE NEMOURS & CO. INC. DEEPWATER	CHAMBERS WORKS WWT PLANT-REMOVAL OF ORGANIC & ORGANO-NITROGEN COMPOUNDS FROM WASTEWATER	HEATH, H.	80494302	CONT	77/06/15	$100,000
** TRAINING **						
NEW JERSEY ENVRN. COMM. ASSOC. MORRISTOWN	TRAINING COURSE FOR LOCAL OFFICIALS RELATIVE TO LOCAL ACTION ON PLANNING ELEMENTS OF PL92-500	ASHMUN, CANDACE M.	90057701	INCR	77/09/26	$40,500

NEW JERSEY

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** TRAINING **						
NEW JERSEY STATE DEPT ENVRN PROTECTION TRENTON	SAFE DRINKING WATER ACT COMMUNICATIONS & TRAINING PROGRAM	LIPPENCOTT,R.	90072301	NEW	77/09/19	$25,000
RUTGERS UNIV./COOK COLLEGE NEW BRUNSWICK	AIR RESOURCES MANAGEMENT AND TRAINING PROGRAM	KAPLOVSKY, J.	90068801	NEW	77/08/02	$30,000
** FELLOWSHIPS **						
NEW JERSEY INST. OF TECH. NEWARK	M.S./AIR POLLUTION CONTROL/PART TIME AGENCY	COLLINS, M.	91109401	NEW	77/08/01	$3,836
RUTGERS UNIV. NEWARK	M.S./PUBLIC ADMIN.-PART TIME	FERRAIUOLO, R.	91101701	NEW	77/08/03	$1,446

N E W   M E X I C O

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
AMERICANS FOR INDIAN OPPORTUNITY ALBUQUERQUE	RESEARCH FOR & DEVELOPMENT OF FEDERAL/AMERICAN INDIAN PROGRAMS FOR THE REGULATION OF PESTICIDES	GOVER, M.	80546701	NEW	77/09/30	$154,086
** TRAINING **						
NEW MEXICO STATE UNIV. LAS CRUCES	TRAINING IN ENGINEERING ASPECTS OF WATER QUALITY	BARKLEY, WILLIAM A.	90019807	INCR	77/08/31	$35,000
NM STATE UNIVERSITY LAS CRUCES	STATE OPERATER TRAINING-WATER POLLUTION CONTROL PROGRAM	WADE O. FREDERICKSON	00619001	NEW	77/09/29	$12,351

NEW YORK

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
AGWAY INC. SYRACUSE	COMPARISON OF OUR DAIRY MANURE AMNEMENT SYSTEMS IN TERNS OF EFFECT	MARTIN, R.	80434902	CONT	77/09/29	$33,299
ASSOCIATED UNIVERSITIES, INC. UPTON	FATE OF HUMAN VIRUSES IN GROUNDWATER RECHARGE SYSTEMS UTILIZING TERTIARY TREATED EFFLUENTS	VAUGHN,J.	80477602	CONT	77/09/09	$99,500
BOYCE THOMPSON INST. YONKERS	RESPONSE OF PLANTS TO AIR POLLUTANTS	WEINSTEIN, L.	80451302	CONT	77/06/20	$76,475
COLUMBIA UNIV. NEW YORK	ENZYMATIC CHARACTERIZATION OF METABOLIC ACTIVATION & DNA-BINDING OF PRESUMPTIVE CARCINOGENS	WEINSTEIN, I. B.	80548201	NEW	77/08/15	$89,954
CORNELL UNIV. GENEVA	STRATEGY OF INSECT CONTROL USING MATING DISRUPTION	ROELOFS, W.	80363402	CONT	77/06/24	$55,934
CORNELL UNIV. ITHACA	EFFECTS OF SO2 AND NOX ON THE SOIL ECOSYSTEM	ALEXANDER, M.	80369103	CONT	77/06/30	$46,000
CORNELL UNIV. ITHACA	IMPROVEMENTS TO PROBABILITY BASED MATCHING FOR UNKNOWN MASS SPECTRA	MCLAFFERTY, FRED W.	80450902	CONT	77/09/27	$53,112
DUDLEY OBSERVATORY LATHAM	FIELD INSTRUMENTATION FOR REAL-TIME MONITORING OF RESPIRABLE & NON-RESPIRABLE DUST CONCENTRATION AIR	PATASHNICK, H.	80522201	NEW	77/08/29	$19,040
HEALTH RES INC/NY STATE DEPT OF HEALTH ALBANY	COMPARATIVE KINETIC STUDIES OF NUTRIENT UPTAKE AND GROWTH IN THE GREAT LAKES PHYTOPLANKTON	PARHAM, THOMAS	80468901	INCR	77/07/27	$8,000
HUNTER COLLEGE OF CUNY NEW YORK	CASE-CONTROL STUDY OF GASTROINTESTINAL-URINARY TRACT CANCER MORTALITY IN RELATION TO DRINKING WATER	KUPCHIK, G.	80525401	NEW	77/06/22	$21,300
BROOKLYN POLYTECHNIC INST. BROOKLYN	URBAN STREET CLEANING	LEVIS, ALEXANDER H.	80093801	INCR	77/06/14	$938

NEW YORK

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
INTERSTATE SAN. COMM. NEW YORK	APPLICABILITY OF PRESSURE FILTRATION-PYROLYSIS OF SEWAGE SLUDGE IN A MULTIPLE HEARTH FURNACE	MYTELKA, ALAN I.	80446301	INCR	77/09/14	$79,000
MANHATTAN COLLEGE BRONX	APPLICATION AND DEVELOPMENT OF EUTROPHICATION PLANNING MODELS FOR LAKE ONTARIO	THOMANN, R.	80368003	CONT	77/04/22	$157,576
MANHATTAN COLLEGE BRONX	MATHEMATICAL MODELS OF FATES OF POLLUTANTS IN ESTUARIES	O'CONNOR, D.	80456302	CONT	77/06/22	$136,645
MANHATTAN COLLEGE BRONX	ANALYSIS OF NUTRIENT AND TOXIC CHEMICAL FLUXES IN GREAT LAKES SEDIMENT	DITORO, D.	80522901	NEW	77/04/21	$124,253
NATIONAL AUDUBON SOCIETY NEW YORK	INTEGRATED APPROACH TO HOME AND GARDEN PEST MANAGEMENT	CALLISON, CHARLES H.	80548401	NEW	77/08/31	$30,927
NEW YORK STATE DEPT OF ENVR CONSERV ALBANY	VERTICAL DISTRIB. OF HYDROCARBONS IN AN ATMOSPH. DURING CONDITION OF LOW LEVEL TEMPERATURE INVERSION	WHITBY, R.	80532701	NEW	77/07/28	$8,180
NEW YORK STATE DEPT. OF HEALTH ALBANY	COMPARTIVE KINETIC STUDIES OF NUTRIENT UPTAKE & GROWTH IN THE GREAT LAKES PHYTOPLANKTON	PARHAM, T.	80468902	CONT	77/08/01	$67,000
NEW YORK STATE UNIV RES. FDN ALBANY	IMPACT OF ZOOPLANKTON GRAZING UPON PHYTOPLANKTON IN EUTROPHIC SAGINAW BAY & WESTERN ERIE	MCNAUGHT, DONALD C.	80457301	INCR	77/04/11	$2,600
NEW YORK STATE UNIV. ALBANY	IMPACT OF ZOOPLANTON GRAZING UPON PHYTOPLANKTON IN EUTROPHIC SAGINAW BAY AND WESTERN LAKE	MCNAUGHT, D.	80457302	CONT	77/05/02	$75,000
NEW YORK STATE UNIV. ALBANY	SAMPLING CHARACTERIZATION AND ANALYSIS MANUAL FOR DREDGE AND FILL MATERIAL	SWEENEY, R.	80557201	NEW	77/09/26	$100,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NEW YORK						
** RESEARCH **						
NEW YORK STATE UNIV/RACHEL CARSON COLL ALBANY	COST BENEFIT OF FUEL REPROCESSING	RESNIKOFF, M.	80494801	NEW	77/05/12	$28,259
NEW YORK UNIV. NEW YORK	CONTINUOUS TWIN SCREW ACID HYDROLYSIS REACTOR FOR ONE TON/DAY CELLULOSE-GLUCOSE PILOT PLANT	BRENNER, W.	80523901	NEW	77/06/03	$212,512
NEW YORK UNIV. STATE RES. FDN. ALBANY	EFFICIENT ALGORITHMS SOLVING SYS OF ORDINARY DIFFERENTIAL EQUATIONS APPLICABLE BASIN ECOSYS MODELING	MALANCHUK, J.	80545201	NEW	77/08/19	$37,995
NEW YORK ZOOLOGICAL SOCIETY BRONX	SUSCEPTIBILITY OF GENETICALLY DEFINED STOCKS OF FISH TO CHEMICAL CARCINOGENS	KALLMAN, KLAUS D.	80538901	NEW	77/07/28	$57,143
ONONDAGA CNTY. N. SYRACUSE	METHODOLOGY FOR ABATMENT OF COMBINE SEWER OVERFLOWS FOR AN URBAN LAKE	KARANIK, J.	80509601	NEW	77/04/14	$18,860
RENSSELAER POLY. INST. TROY	MODELING TRANSPORT & BEHAVIOR OF PESTICIDES & OTHER TOXIC ORGANIC MATERIALS IN AQUATIC ENVIRONMENTS	PARK, R.	80482002	CONT	77/09/22	$118,075
RENSSELAER POLYTECHNIC INST. TROY	ADAPTATION OF AQUATIC ECOSYSTEM MODEL FOR APPLIED USES	PARK, RICHARD A.	80504701	INCR	77/07/06	$64,234
ROCKEFELLER UNIV. NEW YORK	MARINE PROTOZOAN MICROSOMAL ACTIVATION OF OIL POLLUTANTS TO MUTAGENS	LINDMARK, D.	80536401	NEW	77/06/03	$25,000
SYRACUSE RES. FDN. SYRACUSE	NEW APPROACHES TO THE PRESERVATION OF CONTAMINANTS IN WATER SAMPLES	SAXENA, J.	80460902	CONT	77/08/10	$34,995
SYRACUSE UNIV. SYRACUSE	EVAL. OF ALGAL-MEANDER SYSTEM AS A TECHNIQUE FOR ABATING POLLUTION FROM SECONDARY LEAD SMELTERS	JENNETT, J. C.	80473402	CONT	77/09/07	$10,000

N E W   Y O R K

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** DEMONSTRATION **						
NEW YORK STATE DEPT ENVRN CONSERV ALBANY	RENOVATION ON THE 59TH ST, POND, CENTRAL PARK	BERLE, P. A.	80490801	NEW	77/04/07	$325,020
NEW YORK STATE DEPT ENVRN. CONSERV. ALBANY	TIVOLI LAKES RESTORATION PROJECT	BROMBERG, A. W.	80490601	NEW	77/04/11	$121,500
** TRAINING **						
CONFERENCE OF STATE SAN. ENGRS. TROY	STRATEGIC PLANNING PROCESS FOR STATE PUBLIC WATER SYSTEMS SUPERVISION PROGRAMS	THOMPSON, M.	90065401	NEW	77/04/07	$88,407
CORNELL UNIV. ITHACA	WATER QUALITY CONTROL ENGINEERING	GATES, CHARLES D.	90012708	INCR	77/09/12	$35,000
CORNELL UNIV. ITHACA	EDUCATION RELATED TO THE LAND DISPOSAL OF WASTES	LOEHR, RAYMOND	90050002	INCR	77/09/30	$47,660
MANHATTAN COLLEGE BRONX	TRAINING PROFESSIONAL SPECIALISTS IN WATER POLLUTION CONTROL	JERRIS, J. S.	90013507	INCR	77/09/14	$17,600
NATIONAL URBAN LEAGUE, INC. NEW YORK	ENVRN. JOB OPPORTUNITIES STUDY	DANIELS, P.	90069101	NEW	77/05/27	$57,000
			90069101	INCR	77/09/23	$5,000
NEW YORK STATE DEPT ENVRN CONSERV ALBANY	STAFF GUIDE DEVELOPMENT PROJECT GRANT	CAMPBELL, D.	90071201	NEW	77/09/21	$29,955
NEW YORK STATE DEPT ENVRN. CONSERV. ALBANY	DEMONSTRATION OF A 2 YEAR AAS WATER QUALITY MONITORING PROGRAM	CAMPBELL, DANIEL J.	90054001	INCR	77/09/27	$21,000

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APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** TRAINING **						
NEW YORK STATE DEPT OF HEALTH ALBANY	CORRESPONDENCE TRAINING OF WATER SUPPLY OPERATORS	BURKE, M.	90076901	NEW	77/09/19	$25,000
NEW YORK STATE DEPT. ENVRN. CONSERV ALBANY	WATER POLLUTION CONTROL WORKFORCE PLANNING	CAMPBELL, DANIEL	90075301	NEW	77/09/19	$7,860
NEW YORK STATE HEALTH DEPT ALBANY	TRAINING-FELLOWSHIP/PROVIDE FELLOWSHIP FOR STATE AGENCY PERSON TO GET M.S./URBAN & ENVRN STUDIES	BURKE, M.	90072401	NEW	77/09/12	$2,500
SCIENTISTS' INST. FOR PUBLIC INFOR. NEW YORK	S&M PUBLIC WORKSHOP PROGRAM	MESSING, MARC	90041601	INCR	77/05/03	$3,850
** FELLOWSHIPS **						
COLUMBIA UNIV. NEW YORK	ENVRN. QUALITY MGMT./PART TIME AGENCY	MORIATES, S.	91113201	NEW	77/09/12	$1,860
COOPER UNION NEW YORK	M.S./ENVRN. PROTECTION	ABRAMOWITZ, MICHAEL M.	91073801	INCR	77/06/03	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	YEE, FRANK G.	91074001	INCR	77/05/25	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. PROTECTION	VYAS, SAROJ U.	91074301	INCR	77/06/03	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	TRUCHAN, PAUL R.	91074401	INCR	77/05/26	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	TANG, WILLIAM	91074501	INCR	77/05/25	$2,133

N E W   Y O R K

** FELLOWSHIPS **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	STADNYCKI, RICHARD J.	91074801	INCR	77/05/26	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	SIEBENBERG, STANLEY	91075001	INCR	77/05/26	$2,133
COOPER UNION NEW YORK	M.S./PLANNING & MGMT.	SANDERS, HARRIS J.	91075101	INCR	77/05/26	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. PROTECTION	BAST, CLIFFORD C.	91075201	INCR	77/06/03	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	BROPHY, BRIAN E.	91075401	INCR	77/05/26	$2,133
COOPER UNION NEW YORK	M.S./ENGR.	FRIBERG JR., NORMAN R.	91075501	INCR	77/06/03	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	GOLDBERGER, LASLO	91075601	INCR	77/05/25	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	HALPERN, MARK	91075801	INCR	77/05/26	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	VIRENDA, JAIN	91075901	INCR	77/05/26	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	LANDES, JOEL B.	91076101	INCR	77/05/25	$2,133

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	N E W Y O R K					
** FELLOWSHIPS **						
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	LIEBERSTEIN, MELVIN	91076201	INCR	77/06/03	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. PLANNING & MGMT.	MARSH, VERA A.	91076401	INCR	77/05/25	$2,133
COOPER UNION NEW YORK	M.S./ENGR.	MENASHA, ZAKY	91076501	INCR	77/06/03	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	ROTH, PAUL M.	91076701	INCR	77/05/26	$2,133
COOPER UNION NEW YORK	M.S./ENGR.	RUBINSTEIN, S. C.	91077001	INCR	77/06/03	$2,133
COOPER UNION NEW YORK	ENVRN. STUDIES	SANCHEZ, ALBERT	91077101	INCR	77/05/26	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	DIACATOS, P.	91077201	INCR	77/05/25	$2,133
COOPER UNION	M.S./ENVRN. SCI.	[illegible]	91078001	INCR	77/06/10	$2,133
COOPER UNION NEW YORK	M.S./ENVRN. ENGR.	BERLOWITZ, ARTHUR	91075301	INCR	77/05/26	$2,133
NEW YORK POLYTECHNIC INST. BROOKLYN	M.S./CIVIL ENGR.	CAPP, ROBERT J.	91083001	INCR	77/04/21	$120

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
		N E W Y O R K				
** FELLOWSHIPS **						
			91083001	INCR	77/06/21	$4,681
NEW YORK POLYTECHNIC INST. BROOKLYN	M.S./ENVRN. HEALTH SCIENCE	CASHMORE, P.	91108901	NEW	77/09/12	$3,240
NEW YORK STATE UNIV. STONY BROOK	M. S./MECH. ENGR.	KRAMER, S.	91111001	NEW	77/08/04	$2,841
NEW YORK UNIV. NEW YORK	M.S./APPLIED SCIENCE	SAKALA, M.	91110701	NEW	77/08/10	$5,272
RENSSELAER POLYTECHNIC INST. TROY	M.S./URBAN & ENVRN. STUDIES	HUDSON, CHARLES	91081301	INCR	77/09/12	$4,636
RENSSELAER POLYTECHNIC INST. TROY	M.S./URBAN & ENVRN. STUDIES	PEDDADA, A.	91082701	INCR	77/06/09	$4,253
RENSSELAER POLYTECHNIC INST. TROY	M.S./ENVRN. ENGR.-FULL TIME	ZECCOLO, STANFORD J.	91098301	NEW	77/08/02	$4,200
RENSSELAER POLYTECHNIC INST. TROY	M.S./URBAN & ENVRN. STUDIES	MCHALE, M.	91101001	NEW	77/08/10	$4,810
RENSSELAER POLYTECHNIC INST. TROY	M.S./CITY & REGIONAL PLANNING	NUFFER, FREDERICK R.	91107801	NEW	77/09/12	$5,935
RENSSELAER POLYTECHNIC INST. TROY	M.S./PUBLIC ADMIN.	TRENCH, W.	91111201	NEW	77/09/27	$4,200

N O R T H   C A R O L I N A

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
AMERICAN TEXTILE MANUFACTURING INST., CHARLOTTE	TECHNICAL & ECONOMIC EVALUATION OF BATEA GUIDELINES-TEXTILES	NILES, O'JAY	80432901	INCR	77/04/21	$150,000
			80432901	INCR	77/06/01	$88,000
DUKE UNIV., BEAUFORT	EFFECTS OF KEPONE ON LARVAL DEVELOPMENT OF CALLINECTES SAPIDUS & RHITHROPANOPEUS HARRISII	COSTLOW, JOHN D.	80383802	INCR	77/08/16	$25,000
DUKE UNIV., BEAUFORT	EFFECTS OF THERMAL ADDITIONS ON THE DYNAMICS OF FOULING COMMUNITIES AT BEAUFORT	SUTHERLAND, J.	80385002	CONT	77/08/26	$70,000
DUKE UNIV., DURHAM	ULTRASTRUCTURE & X-RAY MICROANALYSIS OF MACROPHAGES EXPOSED TO NONCRITERIA POLLUTANTS	SHELBURNE, J.	80546001	NEW	77/09/22	$60,908
DUKE UNIV., DURHAM	STUDIES RELATED TO THE ORGANIC CHEMICAL ANALYSIS OF INDUSTRIAL SAMPLES	LOCHMULLER, C.	80509001	NEW	77/08/30	$28,014
DUKE UNIV., DURHAM	BIOLOGICAL ASSESSMENT OF EXPOSURE TO SULFUR DIOXIDE AND ACID SULFATE	RAJAGOPALAN, K.	80562201	NEW	77/09/30	$105,129
DUKE UNIVERSITY DURHAM	AN EVALUATION OF THE EMISSION OF NATURAL HYDROCARBONS FROM THE FOREST VEGETATION BY MICROMETEOROLOG.	KNOERR, K. R.	80486001	INCR	77/07/27	$19,000
NORTH CAROLINA STATE UNIV., RALEIGH	MATHEMATICAL TECHNIQUES FOR X-RAY ANALYZERS	GARDNER, R. P.	80275003	INCR	77/09/12	$11,448
			80275003	INCR	77/09/26	$13,552

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD

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** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NORTH CAROLINA STATE UNIV., RALEIGH	MECHANISM & CONTROL OF RAINFALL IMPACT FROM LAND APPLICATION SITES	WESTERMAN, P.	[illegible]	CONT	[illegible]	[illegible]
NORTH CAROLINA STATE UNIV., RALEIGH	EFFECT OF LARGE SCALE AGRICULTURAL LAND DEVELOPMENT ON DRAINAGE WATERS	SKAGGS, R. W.	[illegible]	CONT	[illegible]	[illegible]
NORTH CAROLINA STATE UNIV., RALEIGH	POLYMERIC INTERFACES FOR CONTINUOUS MONITORING OF HYDROCARBON EMISSIONS FROM STATIONARY SOURCES	FELDER, R.	[illegible]	NEW	[illegible]	[illegible]
NORTH CAROLINA STATE UNIV., RALEIGH	STUDY AND USE OF PHOTOACOUSTIC CELLS FOR THE DETECTION OF POLLUTANT GASES & AEROSOLS	PATTY, R.	[illegible]	NEW	[illegible]	[illegible]
			[illegible]	INCR	[illegible]	[illegible]
NORTH CAROLINA STATE UNIV., RALEIGH	GRADUATE RESEARCH IN AIR QUALITY METEOROLOGY	SAUCIER, W.	[illegible]	NEW	[illegible]	[illegible]
NORTH CAROLINA STATE UNIV., RALEIGH	MODELING OF ATMOSPHERIC FLOWS AND POLLUTANT DISPERSAL OVER AND AROUND HILLS & BUILDINGS	ARYA, S. PAL	[illegible]	NEW	[illegible]	[illegible]
NORTH CAROLINA, UNIV OF CHAPEL HILL	GROUNDWATER CONTAMINANTS FROM PRODUCTION OF SYNTHETIC FUELS FROM COAL	SINGER, P.	[illegible]	CONT	[illegible]	[illegible]
NORTH CAROLINA, UNIV. OF CHAPEL HILL	OUTDOOR SIMULATION OF AIR POLLUTION CONTROL STRATEGIES	JEFFRIES, H. E.	[illegible]	INCR	[illegible]	[illegible]
NORTH CAROLINA, UNIV. OF CHAPEL HILL	EXPERIMENTAL STUDY OF AEROSOL FORMATION MECHANISMS IN A CONTROLLED ATMOSPHERE	FOX, DONALD L.	[illegible]	INCR	[illegible]	[illegible]

NORTH CAROLINA

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NORTH CAROLINA, UNIV. OF CHAPEL HILL	PATHOPHYSIOLOGY OF CO EXPOSURE IN ISCHEMIC HEART DISEASE	MCLAURIN, L.	80431602	CONT	77/09/01	$114,426
NORTH CAROLINA, UNIV. OF CHAPEL HILL	DEV. OF AN ON-LINE INFRARED SPECTRAL SEARCH SYS. UTILIZING PATTERN RECOGNITION & INFORM THEORY	ISENHOUR, T.	80438102	CONT	77/07/19	$51,889
NORTH CAROLINA, UNIV. OF CHAPEL HILL	CHLORINATION OF AQUATIC HUMIC SUBSTANCES	CHRISTMAN, R.	80443002	CONT	77/08/02	$112,211
NORTH CAROLINA, UNIV. OF CHAPEL HILL	EFFECT ETIOLOGICALLY-DEFINED RESPIRATORY INFECTION ON LUNG FUNCTION&GROWTH IN LOW AIR POLLUTION AREA	COLLIER, ALBERT M.	80457702	CONT	77/08/01	$216,811
NORTH CAROLINA, UNIV. OF CHAPEL HILL	EFFECTS OF VIRUS PARTICLE AGGREGATION ON THE DISINFECTION OF WATER SUPPLIES	SHARP, D. G.	80463502	CONT	77/08/01	$106,133
NORTH CAROLINA, UNIV. OF CHAPEL HILL	DETECTION OF CARCINOGENICITY OF OILS IN SEA WATER	HUMM, D.	80465002	CONT	77/08/15	$45,000
NORTH CAROLINA, UNIV. OF CHAPEL HILL	EFFECTS OF OZONE ON DNA REPAIR SYNTHESIS IN RABBIT LYMPHOCYTES	CHANEY, S.	80511401	NEW	77/09/09	$47,900
NORTH CAROLINA, UNIV. OF CHAPEL HILL	NEW APPROACHES TO QUANTITATING THE PULMONARY EFFECTS OF INHALED POLLUTANTS	BROMBERG, P. A.	80518401	NEW	77/06/28	$174,870
NORTH CAROLINA, UNIV. OF RALEIGH	RESIDENCE TIME DISTRIBUTIONS,DISPERSION & REENTRAINMENT IN A PILOT-SCALE ELECTROSTATIC PRECIPITATOR	FELDER, R.	80540401	NEW	77/08/04	$42,992
RESEARCH TRIANGLE INST. RES.TRIANGLE PK	POLLUTANTS FROM SYNTHETICS FUELS PRODUCTION	MIXON, F. O.	80497901	INCR	77/04/22	$168,248

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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** RESEARCH **						
RESEARCH TRIANGLE INST. RES. TRI. PARK	SYNTHETIC FUELS RESEARCH PROGRAM	MIXON, F. D	80497902	CONT	77/08/23	$661,608
SAINT AUGUSTINE COLLEGE RALEIGH	LIFE SPAN EFFECTS OF LOW LEVEL HTO EXPOSURE DURING PREGNANCY IN RATS	JOHNSON, W.	80376403	CONT	77/09/26	$28,863
** DEMONSTRATION **						
LAKE LURE, TOWN OF LAKE LURE	MYSTIC LAKE RESTORATION PROJECT	WILSON, J.	80569101	NEW	77/09/30	$20,000
** TRAINING **						
NC DEPT OF NATURAL AND ECONOMIC DEV. RALEIGH	PROVIDE CLASSROOM & ON-THE-JOB TRAINING FOR WWT PLANT OPERATORS	W. E. KNIGHT	00424501	NEW	77/05/16	$26,200
NORTH CAROLINA, UNIV. OF CHAPEL HILL	GRADUATE TRAINING WATER QUALITY ASSESSMENT	WEISS, CHARLES M.	90012208	INCR	77/08/31	$35,100
** FELLOWSHIPS **						
NORTH CAROLINA, UNIV. OF CHAPEL HILL	M.S./REGIONAL PLANNING	MINERVINI, W. P.	91111301	NEW	77/07/27	$4,200
NORTH CAROLINA, UNIV. OF CHAPEL HILL	M.S./CITY & REGIONAL PLANNING	LUND, P.	91111601	NEW	77/09/15	$4,200

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** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NO, DAK, STATE DEPT. OF HEALTH BISMARCK	COLLECTION OF AMBIENT AIR BASELINE DATA FROM THE E	GENE A. CHRISTIANSON,	00812702	INCR	77/08/11	$7,313
NORTH DAKOTA DEPT. OF HEALTH BISMARCK	COLLECTION OF AMBIENT AIR BASELINE DATA FFOM ENERG	W. V. HEUVELEN, EXEC.	00812703	CONT	77/09/30	$60,000
NORTH DAKOTA, UNIV. OF GRAND FORKS	DISPOSAL OF HIGH ALKALINE FLY ASH SLUDGE IN A DECOALED MINE SEAM	MANZ, O.	80545901	NEW	77/08/19	$236,000
			80545901	INCR	77/09/29	$133,080

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** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
AKRON UNIV. OF AKRON	EFFECTS OF AIR POLLUTION: A LONGITUDINAL CROSS SECTIONAL APPROACH (RENEWAL)	MOSTARDI, R. A.	80425602	CONT	77/09/14	$153,904
BATTELLE COLUMBUS LAB. COLUMBUS	TECHNICAL AWARENESS IN THE NONFERROUS METALS INDUSTRY PILOT STUDY	CHERRY, R. H.	80509501	NEW	77/04/11	$41,788
BATTELLE MEMORIAL INST. COLUMBUS	ENVRN. EFFECTS OF UTILIZING SOLID WASTE AS A SUPPLEMENTARY FUEL	VAUGHAN, DALE A.	80400802	INCR	77/09/06	$97,500
BATTELLE MEMORIAL INST. COLUMBUS	ENVIRONMENTAL AND TECHNOLOGICAL ANALYSIS OF THE USE OF SURPLUS WOOD AS AN INDUSTRIAL FUEL	HALL, E. H.	80505001	NEW	77/08/10	$57,000
BATTELLE MEMORIAL INST. COLUMBUS	STAGED COMBUSTION FOR NOX CONTROL AND ENHANCED SO3 EMISSIONS	LEVY, A.	80533001	NEW	77/06/30	$34,559
BATTELLE MEMORIAL INST. COLUMBUS	DEVELOPMENT OF A MODEL OF SO2 OXIDATION IN SMOG	MILLER, D.	80533501	NEW	77/08/19	$50,000
BATTELLE MEMORIAL INST. COLUMBUS	WORKSHOP ON WASTE TO ENERGY TECHNOLOGY	SMITHSON, J. R.	80556101	NEW	77/08/16	$24,990
BATTELLE MEMORIAL INST. COLUMBUS	HEALTH IMPLICATION OF COAL RELATED ENERGY DEVELOPMENT:MINING INPACTS	LAWHON, W.	80570001	NEW	77/09/27	$114,279
CASE WESTERN RESERVE UNIV. CLEVELAND	REACTION KINETICS OF IRON CYANIDE COMPLEXES	PROBER, R.	80532801	NEW	77/06/09	$17,000
CENTRAL STATE UNIV. WILBERFORCE	EVALUATION OF THE DIONEX ION EXCHANGE CHROMATOGRAPH FOR NATURAL WATER SAMPLE ANALYSIS	SCHLUETER, A.	80532901	NEW	77/08/11	$34,902

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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** RESEARCH **						
CHILDREN'S HOSPITAL RESEARCH FDN. COLUMBUS	LONGITUDINAL EVALUATION OF LEAD BODY BURDEN IN GROWING CHILDREN	LUBIN, A. H.	80416802	CONT	77/07/13	$216,285
CINCINNATI, CITY OF CINCINNATI	FEASIBILITY STUDY OF GRANULAR ACTIVATED CARBON ADSORPTION AND ON SITE REGENERATION	MILLER, R.	80544301	NEW	77/08/03	$459,000
CINCINNATI, UNIV. OF CINCINNATI	OCCURRENCE & EFFECTS ORGANICS IN DRINKING WATER-MUTAGENIC & CARCINOGENIC EFFECTS ORGANICS DRINKING W	LOPER, JOHN C.	80420202	INCR	77/07/28	$24,388
CINCINNATI, UNIV. OF CINCINNATI	DETECTION OCCURRENCE CHARACTERIZATION AND PERSISTENCE OF MICROBES IN LANDFILL LEACHATES	SCARPINO, P. V.	80473301	NEW	77/07/28	$57,054
CINCINNATI, UNIV. OF CINCINNATI	LEVEL I PILOT STUDY ON PROCESS & WASTE STREAMS & FUGITIVE EMISSIONS FROM NONFERROUS SMELTERS	CODY, T.	80564401	NEW	77/09/14	$23,309
DAYTON, UNIV. OF DAYTON	HIGH-TEMPERATURE DEGRADATION CHARACTERISTICS OF HAZARDOUS ORGANIC WASTES-A LABORATORY APPROACH	DUVALL, D.	80511701	NEW	77/08/01	$190,000
			80511701	INCR	77/09/23	$75,519
HEIDELBERG COLLEGE TIFFIN	GREAT LAKES POLLUTION CONTROL	DR LESLIE H FISHEL JR	00533801	NEW	77/09/23	$49,315
HEIDELBERG COLLEGE TIFFIN	FLUVIAL TRANSPORT & PROCESSING OF SEDIMENTS & NUTRIENTS FROM NONPOINT SOURCES	BAKER, D.	80543601	NEW	77/09/12	$88,034
MIAMI UNIV. OXFORD	CHRONIC BIOASSAYS WITH DAPHNIDS AS A TOOL FOR PREDICTING THE TOXICITY OF COMPLEX INDUS. EFFLUENTS	WINNER, ROBERT W.	80519301	NEW	77/06/21	$21,063

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APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
NATIONAL WATER WELL ASSOC. WORTHINGTON	MANUAL OF WATER WELL MAINTENANCE & REHABILITATION TECHNOLOGY	LEHR, JAY H.	80521101	NEW	77/04/22	$91,848
OHIO AGRI. RES. & DEVELOPMENT CENTER WOOSTER	EFFECT OF LIVESTOCK PASTURING ON NON-POINT SURFACE RUNOFF	WHITE, R. K.	80463102	CONT	77/06/03	$87,898
OHIO RIVER VALLEY WATER SAN. COMM. CINCINNATI	ORGANIC SUBSTANCES IN THE OHIO RIVER AND ASSOCIATED WATER SUPPLIES	BOES, R.J.	80461502	CONT	77/09/14	$150,000
OHIO STATE UNIV. COLUMBUS	APPLICATION OF FOURIER TRANSFORM SPECTROSCOPY TO AIR POLLUTION PROBLEMS	SHAW, J.	80386803	CONT	77/07/21	$95,000
OHIO STATE UNIV. COLUMBUS	EFFECTS/SIZED ASBESTOS FIBERS ON CELLULAR DNA MEMBRANE STRUCTURE-FUNCTION, INTERMEDIARY METABOLISM	HART, R.	80420102	CONT	77/04/22	$130,956
OHIO STATE UNIV. COLUMBUS	LIMNOLOGICAL INVESTIGATION OF WATER QUALITY AND FISH LARVAE IN LAKE ERIE	HERDENDORF, C.	80461202	CONT	77/05/10	$127,082
OHIO STATE UNIV. COLUMBUS	CHLORINATED HYDROCARBONS: INSECTICIDE VS. CARCINOGENIC ACTION	HART, R.	80500801	NEW	77/06/22	$49,000
OHIO STATE UNIV. COLUMBUS	METALLURGICAL&OPERATING VARIABLE SCALING&CORROSION WATER RECYCLING&TREATMENT INTEGRATED STEEL PLANTS	ST. PIERRE, G.	80527801	NEW	77/08/19	$47,915
OHIO STATE UNIV. COLUMBUS	OHIO RIVER BASIN ENERGY STUDY: PHASE II	GORDON, S.	80558901	NEW	77/09/22	$30,000
OHIO STATE UNIV. RES FDN COLUMBUS	LIMNOLOGICAL INVESTIGATIONS OF WATER QUALITY & FISH LARVAE IN LAKE ERIE	HERNDENDORF, CHARLES E	80461201	INCR	77/04/15	$38,455

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APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
OHIO STATE UNIV. RES. FDN. COLUMBUS	LAKE ERIE WATER QUALITY SURVEILLANCE PROGRAM	KENNETH W SLOAN EXECUT	00532901	NEW	77/04/19	$160,178
OHIO STATE UNIV. RES. FDN. COLUMBUS	WATER POLLUTION CONTROL RESEARCH DEV & DEMON	RONALD A WRIGHT DIR	00533601	NEW	77/09/09	$55,952
OHIO STATE UNIV. RES. FDN. COLUMBUS	DEVELOPMENT OF A TISSUE SELECTIVE IN VIVO BIOASSAY FOR ENVRN. AGENTS PRODUCING DNA DAMAGE	HART, R.	80533701	NEW	77/08/23	$200,000
THE OH STATE UNIV RESEARCH FOUND COLUMBUS	LAKE ERIE WATER QUALITY SURVEILLANCE PROGRAM	KENNETH W SLOAN EXECUT	00532901	INCR	77/09/08	$39,949
WOOSTER, COLLEGE OF WOOSTER	INVESTIGATE EFFECTS OF COAL-FIRED POWER PLANT EMISSIONS ON TISSUE STRUCTURE OF SELECTED BIRD SPECIES	KERN, M. D.	80537001	NEW	77/07/01	$27,154
** DEMONSTRATION **						
FARM BUREAU DEVELOPMENT CORP. COLUMBUS	DEMONSTRATION PROGRAM TO SHOW OHIO LANDOWNERS & MUNICIPALITIES ACCEPTABLE SYSTEM FOR APPLYING SLUDGE	HILL, J. K.	80518901	NEW	77/09/15	$195,681
** TRAINING **						
CINCINNATI, UNIV. OF CINCINNATI	GRADUATE TRAINING IN WATER POLLUTION CONTROL	EYE, J. D.	90012306	INCR	77/09/12	$16,000
CINCINNATI, UNIV. OF CINCINNATI	TRAINING PROGRAM IN AIR POLLUTION	SALTZMAN, B.	90068401	NEW	77/07/27	$30,000
CINCINNATI, UNIV. OF CINCINNATI	WATER POLLUTION CONTROL PROFESSIONAL TRAINING GRANT	FOWLER, THADDEUS W.	90069901	NEW	77/09/14	$20,633

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
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** TRAINING **						
CINCINNATI, UNIV. OF CINCINNATI	WATER QUALITY SAMPLES FROM PUBLIC WATER SYSTEM	SCARPINO, P.	90074101	NEW	77/09/30	$48,517
OHIO STATE UNIV. COLUMBUS	INFORMATION COLLECTION, ANALYSIS & DISSEMINATION	HOWE, R.	90071001	NEW	77/09/20	$114,460
TOLEDO, UNIV. OF TOLEDO	WATER POLLUTION CONTROL TRAINING GRANT	BENNETT, GARY F.	90013208	INCR	77/09/15	$22,900
** FELLOWSHIPS **						
AKRON, UNIV. OF AKRON	AIR POLLUTION CHEMIST	MCNALLY, M.	91109101	NEW	77/08/10	$3,165
CINCINNATI, UNIV. OF CINCINNATI	M.S./ENVRN. ENGR.	SHOEMAKER, JERRY L.	91108101	NEW	77/07/28	$8,550
TOLEDO, UNIV. OF TOLEDO	M.S./CHEMICAL ENGR.	MUNN, P.	91104501	NEW	77/07/28	$6,525

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** RESEARCH **						
OKLAHOMA ST. UNIV. STILLWATER	RANGELAND WATERSHED WATER BUDGET & GRAZING CATTLE WASTE NUTRIENT CYCLING	COURI, DANIEL	80373501	INCR	77/08/29	$120,000
OKLAHOMA STATE DEPT. OF HEALTH OKLAHOMA CITY	SPRAY RUNOFF/TREATMENT OF MUNICIPAL WASTEWATER	KEENE, FORREST	80321801	INCR	77/09/27	$55,000
OKLAHOMA STATE UNIV. STILLWATER	BIO ORGANIC INDICATORS OF GROUND WATER POLLUTION	MORRILL, L.	80461302	CONT	77/09/19	$169,415
OKLAHOMA STATE UNIV. STILLWATER	PROJECT TO DEVELOP AND EVALUATE AN ENVRN. TECH. TRANSFER SYSTEM	FITE, R.	80484702	CONT	77/09/27	$43,000
OKLAHOMA STATE UNIV. STILLWATER	TREATMENT CAMPATIBILITY OF MUNICIPAL WASTE AND BIOLOGICAL HAZARDOUS INDUSTRIAL COMPOUNDS	GAUDY, A. F.	80524201	NEW	77/06/27	$174,887
OKLAHOMA STATE UNIV. STILLWATER	EFFECTIVENESS&COST OF ACTIVE CARBON ADSORPTION OF TOXIC COMPOUNDS FROM PETROLEUM REFINERY WASTEWATER	BURKS, S.	80530701	NEW	77/07/07	$42,746
OKLAHOMA STATE UNIV. STILLWATER	SYNTHESIS AND PURIFICATION OF HIGH PURITY AROMATIC COMPOUNDS	EISENBRAUN, E. J.	80541901	NEW	77/07/06	$40,000
OKLAHOMA STATE UNIV. STILLWATER	A NEW SAMPLING THEORY FOR THE MEASUREMENT OF ECOSYSTEM STRUCTURE AND FUNCTION	MULHOLLAND, R. J.	80556401	NEW	77/09/22	$25,538
OKLAHOMA, UNIV. OF OKLAHOMA CITY	EFFECTS OF CHLORIDIMEFORM ON VASCULAR TISSUE	ROBINSON, C. P.	80497501	NEW	77/05/25	$32,047
** DEMONSTRATION **						
OKLAHOMA CONSERVATION COMM. OKLAHOMA CITY	PAULS VALLEY LAKE RESTORATION	GRIMMETT, JACK	80489601	NEW	77/08/16	$300,000

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APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** TRAINING **						
NATIONAL RURAL WATER ASSOC. DUNCAN	STATE RURAL WATER TRAINING AND TECHNICAL ASSISTANCE PROGRAM	MONTGOMERY, J. H.	90064701	INCR	77/08/04	$5,000
OKLAHOMA STATE DEPT. OF HEALTH OKLAHOMA CITY	WATER SUPPLY STATE TRAINING/POLLUTION ABATEMENT & CONTROL	MCBRYDE, G.	90075201	NEW	77/09/22	$5,200
OKLAHOMA STATE UNIV. STILLWATER	TRAINING IN WATER POLLUTION CONTROL (ENGINEERING SCIENCE; INTERDISCIPLINARY)	GAUDY, ANTHONY F.	90007806	INCR	77/09/08	$16,880
OSCAR ROSE JR. COLLEGE MIDWEST CITY	STATE & LOCAL MANPOWER DEVELOPMENT PROGRAM	DR. ROBERT PARK, CHAIR	00618901	NEW	77/09/29	$20,444
** FELLOWSHIPS **						
OKLAHOMA, UNIV. OF NORMAN	M.S./CIVIL ENGR. & ENVRN. SCIENCE	D'ANDREA, NATAL V.	91079701	INCR	77/04/15	$1,085
OKLAHOMA, UNIV. OF NORMAN	M.S./ENVRN. SCIENCE	SLADE, W.	91114201	NEW	77/09/14	$4,200

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APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
OREGON GRAD. CTR. FOR STUDY & RES. BEAVERTON	THE CONTINUOUS MONITORING OF PARTICULATE SULFUR COMPOUNDS BY FLAME PHOTOMETRY	HUNTZICKER, JAMES J.	80475002	CONT	77/08/23	$35,000
OREGON STATE UNIV. CORVALLIS	DEVELOP PROCEDURES BASED TOXICITIES EVALUATE EFFECTS CHRONIC EXPOSURE OF FISH ENVRN. CONTAMINANTS	WEBER, L.	80309004	CONT	77/09/20	$23,118
OREGON STATE UNIV. CORVALLIS	EFFECT ON NON-GASEOUS AIRBORNE POLLUTANTS FROM COAL-FIRED POWER PLANTS ON PLANT GROWTH & METABOLISM	LANDA, EDWARD R.	80394802	INCR	77/08/31	$9,592
OREGON STATE UNIV. CORVALLIS	EFFECTS OF COMPOUNDS PRODUCED FROM PETROLEUM UTILIZATION ON SELECTED MARINE INVERTEBRATES	MIX, M.	80442702	CONT	77/06/08	$20,000
OREGON STATE UNIV. CORVALLIS	ORIGIN VIRULENCE GROWTH AND CONTROL OF COLIFORMS IN DRINKING WATER EMANATING FROM WOODEN TANKS	SEIDLER, R.	80445602	CONT	77/06/30	$26,038
OREGON STATE UNIV. CORVALLIS	MICROCOSM AND THEORETICAL EVALUATION OF SUBSTITUTE CHEMICALS	WARREN, C.E.	80462202	CONT	77/09/08	$50,000
OREGON STATE UNIV. CORVALLIS	ENVIRONMENTAL CONTAMINANTS: EFFECTS ON TUMOR GROWTH & IMMUNITY	KOLLER, LOREN D.	80521001	NEW	77/07/06	$105,475
OREGON STATE UNIV. CORVALLIS	EFFECTS OF CHROMIUM AND NUTRIENT POLLUTANTS ON NATURAL PHYTOPLANKTON POPULATIONS	SMALL, L.	80528201	NEW	77/06/13	$174,673
OREGON STATE UNIV. CORVALLIS	EFFECT OF ENVRN. POLLUTANTS ON SUSCEPTIBILITY OF SALMONID FISH TO VIRAL & BACTERIAL PATHOGENS	HETRICK, FRANK	80540701	NEW	77/09/19	$42,576
OREGON STATE UNIV. CORVALLIS	FIELD EVALUATION OF ROCK FILTERS FOR REMOVAL OF ALGAE IN LAGOON EFFLUENTS	WILLIAMSON, K.	80541601	NEW	77/08/30	$59,950

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	O R E G O N					
** RESEARCH **						
OREGON STATE UNIV. CORVALLIS	PLANS FOR INVESTIGATION OF NONSTEADY STATE PHENOMENA OF STREAM SEDIMENTATION	WARREN, C.	80542301	NEW	77/08/19	$45,000
OREGON STATE UNIV. CORVALLIS	DEVELOPMENT OF A WATER QUALITY MODEL FOR FEEDLOT RUNOFF CONTROL SYSTEMS	KOELLIKER, J.	80549901	NEW	77/08/16	$74,659
OREGON STATE UNIV. CORVALLIS	LAKE VANCOUVER WASHINGTON SOCIAL IMPLICATION OF LAKE RESTORATION PROGRAM	HOGG, T.	80551001	NEW	77/08/15	$87,901
OREGON STATE UNIV. CORVALLIS	EFFECTS OF PETROLEUM HYDROCARBONS ON FATTY ACID METABOLISM IN MARINE FISHES	CALDWELL, R.	80562501	NEW	77/09/08	$84,757
OREGON, UNIV. OF PORTLAND	DETERMINATION OF GIARDIA CYST VIABILITY	MEYER, E. A.	80489802	CONT	77/09/20	$41,983
** TRAINING **						
LINN-BENTON COLLEGE ALBANY	WASTEWATER TECHNOLOGY	SCOTT, P.	90012805	INCR	77/09/23	$7,000
LINN-BENTON COMMUNITY COLLEGE ALBANY	TWO DAY WORKSHOP AND ONE-TO-ONE TRAINING FOR WATER SYSTEMS OPERATOR	PETER C. SCOTT, DIRECT	00013178	NEW	77/09/30	$25,000
OREGON STATE UNIV. CORVALLIS	GRADUATE TRAINING IN WATER QUALITY	SCHAUMBURG, FRANK D.	90007208	INCR	77/09/12	$19,800
OREGON STATE UNIV. CORVALLIS	GRADUATE TRAINING IN AIR POLLUTION CONTROL	BOUBEL, R.	90068301	NEW	77/08/10	$30,000
** FELLOWSHIPS **						
OREGON STATE UNIV. CORVALLIS	M.S./CIVIL ENGR.	DOWNS, S. C.	91112701	NEW	77/09/19	$4,200

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD

OREGON

P E N N S Y L V A N I A

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
ACADEMY OF NATURAL SCIENCES PHILADELPHIA	INVESTIGATION OF THE ECOLOGICAL EFFECTS OF OZONE PRODUCED OXIDANTS TO SELECTED ESTUARINE SPECIES	BURTON, D.	80468302	CONT	77/08/29	$50,000
AMERICAN SOCIETY FOR TESTING&MATERIALS PHILADELPHIA	CONFERENCE ON INTERNATIONAL AIR QUALITY MEASUREMENTS	LEVADIE, B.	80359303	CONT	77/04/22	$5,000
BITUMINOUS COAL RES. INC. MONROEVILLE	COAL AND THE ENVIRONMENT ABSTRACT SERIES	BOYER, J.	80533601	NEW	77/06/29	$32,960
CARNEGIE MELLON INST. OF RES. PITTSBURG	PERFORMANCE OF ALTERNATE COATINGS IN THE ENVRN.	KEANE, J. D.	80502701	NEW	77/04/07	$35,000
DREXEL UNIV. PHILADELPHIA	MICROWAVE SYSTEM FOR LOCATING FAULTS IN HAZARDOUS MATERIAL DIKES: PARAMETER SPECIFICATION	KOERNER, R. M.	80476301	INCR	77/09/22	$12,076
DREXEL UNIVERSITY PHILADELPHIA	SPILL ALERT DEVICE FOR IMPOUNDED HAZARDOUS MATERIALS	KOENER, ROBERT M.	80251103	INCR	77/07/15	$15,000
FRANKLIN INST. PHILADELPHIA	PREPARATION OF THE MUNICIPAL TECHNOLOGY BULLETIN AND INPUT TO THE WRSIC DATA SERVICE	KUTCHER, J.	80492201	INCR	77/08/23	$57,219
PENNSYLVANIA DEPT. OF ENVRN. RESOURCES HARRISBURG	EFFECTIVENESS REGULATIONS & PRACTICES HANDLING TOXIC STRIP MINE SPOILS TO PREVENT ACID MINE DRAINAGE	THOMPSON, D.	80559801	NEW	77/09/15	$112,475
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	SELECT RESEARCH GROUP IN AIR POLLUTION METEOROLOGY	THOMSON, D.	80039705	CONT	77/04/07	$220,000
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	DESIGN OF STACK SAMPLING SYSTEM WITH DILUTION	HEINSOHN, R.	80356003	CONT	77/06/09	$25,000

P E N N S Y L V A N I A

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	CHEMICAL IONIZATION MASS SPECTROMETRY OF ORGANIC & ORGANOMETALLIC COMPOUNDS	RISBY, TERENCE	80365102	INCR	77/09/27	$12,338
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	FIELD STUDIES ON ACID MINE DRAINAGE TREATMENT WITH THE ROTATING BIOLOGICAL CONTACTOR	UNZ, R. F.	80513201	NEW	77/04/22	$62,915
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	SATELLITE A IN STATISTICAL ECOLOGY OF THE SECOND INTERNATIONAL ECOLOGICAL CONGRESS	PATIL, G. P.	80542201	NEW	77/09/22	$5,000
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	AIRCRAFT RADIATION MEASUREMENTS OVER ST. LOUIS	CARLSON, T.	80550001	NEW	77/09/06	$16,000
PITTSBURG, UNIV. OF PITTSBURGH	HEALTH EFFECTS OF ENERGY BY PRODUCTS ON DRINKING WATER	SHAPIRO, M. A.	80559901	NEW	77/09/30	$101,842
PITTSBURGH, UNIV. OF PITTSBURGH	ION CHROMATOGRAPHY OF AROMATIC AMINES	FROHLIGER, J.	80529801	NEW	77/08/10	$44,188
PITTSBURGH, UNIV. OF PITTSBURGH	ORGANIC EMISSIONS FROM SINTERING PLANTS-DETERMINATION OF CAUSES AND METHODS OF ABATEMENT	STOEHR, R.	80530401	NEW	77/06/20	$9,456
PITTSBURGH, UNIV. OF PITTSBURGH	ALGAE IN OPEN DRINKING WATER RESERVOIRS & TOXICITY OF SCHIZOTHRIX CALCIOLA	SYKORA, J.	80536801	NEW	77/08/01	$30,612
PITTSBURGH, UNIV. OF PITTSBURGH	OHIO RIVER BASIN ENERGY STUDY: PHASE II: PITTSBURGH PARTICIPATION	SHAPIRO, M.	80560801	NEW	77/09/22	$80,000
RESOURCE MANAGEMENT ASSOC. WEST CHESTER	APPLICATION OF THE NON POINT SOURCE MODEL TO AN AGRICULTURAL WATERSHED	CAHILL, T.	80542101	NEW	77/09/14	$40,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	PENNSYLVANIA					
** RESEARCH **						
SUSQUEHANNA UNIV. SELINSGROVE	RECOVERY STUDIES OF PESTICIDES IN SURFACE AND DRINKING WATER	MCGRATH, T.	80429402	CONT	77/06/28	$24,946
** DEMONSTRATION **						
APPLIED TECHNOLOGY ASSOCIATES, INC. PHILADELPHIA	DEMONSTRATION OF A LEACHATE TREATMENT PLANT	FUNGAROLI, A. A.	80392601	INCR	77/09/29	$77,993
MATLACK, INC. LANSDOWNE	TRUCK WASHING TERMINAL WATER POLLUTION CONTROL	O'BRIEN, JOHN E.	80365601	INCR	77/09/09	$54,000
PENNSYLVANIA STATE DEPT ENVRN RESOURCE HARRISBURG	DEMONSTRATE/EVALUATE RECLAMATION STABILIZATION/ EROSION CONTROL STRIP MINED LAND AGRI USING SLUDGE	BUCCIARELLI, W.	80451102	CONT	77/09/23	$100,000
PENNSYLVANIA, COMMONWEALTH OF HARRISBURG	DEMONSTRATION OF CONNECTOR WELLS	BEARD, VERNON M.	80519101	INCR	77/05/20	$40,000
** TRAINING **						
AMERICAN LAW INST. PHILADELPHIA	SUPPORT OF PUBLIC INTEREST ENVRN. LAWYERS FOR TRAINING IN ENVRN. LAW	MACLAY, D.	90065601	NEW	77/08/09	$25,000
PENNSYLVANIA ENVIRONMENTAL COUNCIL PHILADELPHIA	HAZARDOUS WASTE MGMT. LEGISLATIVE-ADMINISTRATIVE PUBLIC FORUM	WINSOR, ELEANOR	90069601	NEW	77/09/29	$4,500
PENNSYLVANIA STATE DEPT COMMUN AFFAIRS HARRISBURG	SAFE DRINKING WATER ACT TRAINING	KLAUS, G.	90074201	NEW	77/09/22	$25,000
PENNSYLVANIA STATE DEPT ENVRN RESOURCE HARRISBURG	STATE PUBLIC WATER SYSTEM SUPERVISION	GODDARD, M.	90072601	NEW	77/09/12	$1,192

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	P E N N S Y L V A N I A					
** TRAINING **						
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	GRADUATE TRAINING IN AIR POLLUTION	ENGEL, ALFRED J.	90067801	NEW	77/08/02	$30,000
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	CURRICULUM DEVELOPMENT OF A BACHELOR OF ENGINEERING TECHNOLOGY IN WATER QUALITY MANAGEMENT	COLE, C.	90070401	NEW	77/08/15	$38,000
PITTSBURGH, UNIV. OF PITTSBURGH	GRADUATE TRAINING IN AIR POLLUTION	CORN, M.	90067701	NEW	77/08/05	$30,000
** FELLOWSHIPS **						
DREXEL UNIV. PHILADELPHIA	M.S./ENVRN. PROTECTION SPEC.	RAHN, RONALD T.	91077301	INCR	77/04/11	$374
DREXEL UNIV. PHILADELPHIA	M.S./ENVRN. ENGR.	SCOOTT, R. W.	91103701	NEW	77/07/28	$8,289
DREXEL UNIV. PHILADELPHIA	M.S./ENVRN. ENGR.	MILLER, W.	91104101	NEW	77/07/28	$2,584
DREXEL UNIV. PHILADELPHIA	M.S./ENVRN. ENGR.	CICIRETTI, N.	91104201	NEW	77/07/27	$8,289
PENNSYLVANIA STATE UNIV. UNIVERSITY PARK	M.S./PUBLIC ADMIN.-PART TIME	O'CONNOR, N.	91102001	NEW	77/08/26	$2,072
PENNSYLVANIA, UNIV. OF PHILADELPHIA	M. S./REG. PLANNING	KIRKPATRICK, AMANDA S.	91107401	NEW	77/08/16	$7,625

R H O D E   I S L A N D

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
RAYTHEON COMPANY PORTSMOUTH	DEVELOPMENT OF A DYNAMIC, TWO-LAYER MODEL FOR STRATIFIED ESTUARIES	CHAMBERLAIN, S.	80517001	INCR	77/07/19	$47,195
RHODE ISLAND, UNIV. OF KINGSTON	NUTRITIONAL REQUIREMENTS OF MARINE LARVAL AND JUVENILE FISH	SIMPSON, K.	80381803	CONT	77/08/29	$25,000
RHODE ISLAND, UNIV. OF KINGSTON	A FACILITY FOR THE EXPERIMENTAL ANALYSIS OF COASTAL MARINE	KNAUSS, J.	80390203	CONT	77/06/27	$980,000
RHODE ISLAND, UNIV. OF KINGSTON	DIFFUSION CHAMBER ARRAY FOR AQUATIC ENVIRONMENTAL EXPOSURE	SIEBURTH, J.	80488602	INCR	77/08/16	$5,900
RHODE ISLAND, UNIV. OF KINGSTON	CONTAMINENT FLUX FROM MARINE SEDIMENTS & DREDGE SPOIL DESPOSITS	BENDER, M. L.	80512901	NEW	77/04/01	$60,718
			80512901	INCR	77/08/16	$7,500
RHODE ISLAND, UNIV. OF KINGSTON	DEVELOP & APPLY LABORATORY MICROCOSMS FOR PERTURBATION EXPERIMENTS OF COASTAL MARINE ECOSYSTEMS	NIXON, S.	80546301	NEW	77/09/19	$75,499
RHODE ISLAND, UNIV. OF KINGSTON	CHEMICAL STUDIES DIRECTED TOWARD ECOLOGICAL DAMAGE ASSESSMENT OF PETROLEM DISCHARGES IN MARINE ENVRN	QUINN, J.	80547701	NEW	77/08/23	$64,990
RHODE ISLAND, UNIV. OF KINGSTON	PHAGE RESISTANCE MEANS SEPARATING HUMAN & ANIMAL E. COLI STRAINS & DEFINING COLONIZATION POTENTIALS	COHEN, P.	80548801	NEW	77/08/04	$42,185
RHODE ISLAND, UNIV. OF KINGSTON	STANDARD PROGRAM FOR ENVRN. IMPACT ASSESSMENT	SAILA, SAUL B.	80421601	INCR	77/08/30	$10,530

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
R H O D E I S L A N D						
** DEMONSTRATION **						
RHODE ISLAND, STATE OF PROVIDENCE	SOLID WASTE DEMO GRANT	DR. JOSEPH E. CANNON	00110701	INCR	77/06/22	$35,000
** FELLOWSHIPS **						
RHODE ISLAND, UNIV. OF KINGSTON	M.S./CHEMISTRY	CUCCO, JOHN A.	91052001	INCR	77/07/28	$1,565
RHODE ISLAND, UNIV. OF KINGSTON	M.S./ENVRN. HEALTH SCIENCE	DOLCE, THOMAS J.	91092301	INCR	77/08/15	$1,840

S O U T H   C A R O L I N A

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
BENEDICT COLLEGE COLUMBIA	EVALUATION OF FLAMELESS & HYDRIDE GENERATION ATOMIC ABSORPTION METHODS FOR ARSENIC & SELENI	KINARD, J	80523701	NEW	77/09/02	$42,306
CHARLESTON, COLLEGE OF CHARLESTON	FEED WEBS, POPULATIONS & PRODUCTIVITY IN A SOUTHEAST COASTAL MARINE MARSH	CHAMBERLAIN, N.	80468802	CONT	77/08/05	$50,000
CHARLESTON, COLLEGE OF CHARLESTON	INVESTIGATION OF ITS POTENTIAL AS A CANCER RESEARCH AND CHEMICAL CARCINOGEN SCREENING ORGANISM	KOENIG, C.	80546901	NEW	77/08/29	$86,000
CLEMSON UNIV. CLEMSON	DEVELOPMENT OF ALTERNATIVE CONTROL METHODS TO MIREX AND CHLORDANE FOR THE IMPORTED FIRE ANT	HAYS, S.	80471702	CONT	77/08/15	$39,000
CLEMSON UNIVERSITY CLEMSON	INVESTIGATION OF TREATMENT TECHNOLOGIES FOR DYE MANUFACTURE WASTEWATERS	KEINATH, THOMAS M.	80500201	INCR	77/07/29	$54,768
GREENWOOD COMM. OF PUBLIC WORKS GREENWOOD	PROTECTION OF ASBESTOS-CEMENT PIPE FROM CORROSION IN WATER DISTRIBUTION SYSTEMS BY WASTE TREATMENT	GRUBB, C.E.	80488802	CONT	77/09/15	$11,160
SOUTH CAROLINA, UNIV. OF COLUMBIA	DEVELOP COLLECTION METHODS FOR AIRBORNE PESTICIDES & POLYCHOLINATED BIPHENYLS USING SOLID ADSORBENTS	BIDLEMAN, TERRY F.	80471601	INCR	77/09/15	$44,922
SOUTH CAROLINA, UNIV. OF COLUMBIA	COREHOLE SPACING MODELS DEFINING POTENTIAL TOXIC ROCK BODIES	HORNE, J. C.	80510101	NEW	77/06/28	$108,787
SOUTH CAROLINA, UNIV. OF COLUMBIA	PREDICTING ACID POLLUTION POTENTIAL FROM COAL STRIP MINES	CARUCCIO, F.	80511601	NEW	77/06/21	$85,684
** DEMONSTRATION **						
LA FRANCE INDUSTRIES LA FRANCE	CLOSED CYCLE TEXTILE DYEING-FULL SCALE DEMONSTRATION	HILL, DON	80518201	NEW	77/08/31	$349,200

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
S O U T H C A R O L I N A						
** DEMONSTRATION **						
SOUTH CAROLINA, UNIV. OF COLUMBIA	DEMONSTRATION & EVALUATION OF SEDIMENT & EROSION CONTROL TECHNIQUES APPLICABLE TO S.E. PIEDMONT	CARUCCIO, F.	80372402	CONT	77/04/08	$80,991
** TRAINING **						
CLEMSON UNIV. CLEMSON	PROFESSIONAL TRAINING IN WATER SUPPLY & POLLUTION CONTROL	RICH, LINVIL C.	90014607	INCR	77/08/29	$33,000
CLEMSON UNIV. CLEMSON	STAFF GUIDE DEVELOPMENT PROJECT GRANT	ALLEN, J.	90071401	NEW	77/09/14	$10,754
KY DEPT. FOR NATURAL RES & ENV PROT FRANKFORT	WATER POLLUTION CONTROL, STATE & INTERSTATE PROGRAM GRANT	ROBERT D. BELL	00424877	NEW	77/07/11	$5,000
SC DEPT OF HEALTH AND ENVIRONMENTAL CO COLUMBIA	LAB TRAINING TO HELP WWTP OPERATORS MEET SELF-MONITORING REQUIREMENTS	JOHN E. JENKINS	00424701	NEW	77/06/20	$10,000
SOUTH CAROLINA DEPT ENVRN CONTROL COLUMBIA	WATER SUPPLY GRADUATE TRAINING	LOCKHART, L.	90072501	NEW	77/09/08	$8,216
SOUTHERN EDUC. COMMUNICATIONS ASSOC. COLUMBIA	CHEMICALS IN THE ENVRN.	WALL, M.	90076701	NEW	77/09/30	$118,234
** FELLOWSHIPS **						
CLEMSON UNIV. CLEMSON	M.S./ENVRN. SYSTEMS ENGR.-FULL TIME	RHODES, WALTON T.	91105201	NEW	77/08/16	$1,500
			91105201	INCR	77/09/12	$6,500

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	SOUTH CAROLINA					
** FELLOWSHIPS **						
CLEMSON UNIV. CLEMSON	M.S./ENGR.	CARPENTER, W. G.	91111901	NEW	77/08/31	$4,200
SOUTH CAROLINA, UNIV. OF COLUMBIA	M.S./ENGR.	PEARSON, O.	91072401	INCR	77/09/08	$360
SOUTH CAROLINA, UNIV. OF COLUMBIA	AIR POLLUTION CONTROL-PART TIME	BETTERTON, ROBERT J.	91105301	NEW	77/08/23	$826
SOUTH CAROLINA, UNIV. OF COLUMBIA	M.S./PUBLIC ADMINISTRATION	BRANTLEY, WILLIAM P.	91105401	NEW	77/07/28	$1,090
SOUTH CAROLINA, UNIV. OF COLUMBIA	M.S./ENGR.-PART TIME	TERRY, WILLIAM D.	91105601	NEW	77/08/16	$1,300
SOUTH CAROLINA, UNIV. OF COLUMBIA	M.S./PUBLIC ADMINISTRATION/PART-TIME AGENCY	WILLIAMS, EARL M.	91105701	NEW	77/09/12	$1,474
SOUTH CAROLINA, UNIV. OF COLUMBIA	M. S./ENGR.	HARMON, BARNEY L.	91112101	NEW	77/08/16	$810
SOUTH CAROLINA, UNIV. OF COLUMBIA	M.S./PUBLIC ADMIN.	FABEL, D.	91112201	NEW	77/08/29	$1,195

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	SOUTH DAKOTA					
** RESEARCH **						
SOUTH DAKOTA DEPT OF ENVIR PROT PIERRE	NORTHERN PLAINS AIR QUALITY RESEARCH M	HAROLD LENHART, SECTAR	00811403	CONT	77/09/30	$10,000
SOUTH DAKOTA SCHOOL OF MINES & TECH RAPID CITY	PREVENTING HALOFORM FORMATION IN DRINKING WATER	HARMS, L.	80514901	NEW	77/04/22	$74,999
SOUTH DAKOTA STATE UNIV. BROOKINGS	INFILTRATION LAND TREATMENT OF STABILIZATION POND EFFLUENT	DORNBUSH, J.	80380402	INCR	77/05/25	$2,560
** DEMONSTRATION **						
SOUTH DAKOTA DEPT. OF ENVIR. PROT. PIERRE	SOLID WASTE DEMONSTRATION PROJECT THROUGHOUT STATE	ROGER W. STEAD, CHIEF	00817101	INCR	77/06/30	$32,000
** TRAINING **						
SOUTH DAKOTA DEPT. OF ENVIR. PIERRE	SOUTH DAKOTA WASTEWATER OPERATOR TRAINING PROJECT.	ALLYN O. LOCKNER, SECR	00819001	NEW	77/08/02	$15,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	T E N N E S S E E					
** RESEARCH **						
NASHVILLE THERMAL TRANSFER CORP. NASHVILLE	BAGHOUSE STUDY AS AN EMISSION CONTROL ON A SOLID WASTE INCINERATOR/BOILER	MCDERMOTT, BERNARD A.	80423301	INCR	77/08/02	$67,079
TENNESSEE STATE DEPT. OF CONSERV. NASHVILLE	DESIGN & PERFORMANCE OF HEAD-OF-HOLLOW FILLS-A SURFACE MINING & RECLAMATION METHOD	SAIN, HERMAN A.	80527201	NEW	77/08/01	$67,000
TENNESSEE, UNIV. OF KNOXVILLE	DATABASE LOCATION & EVALUATION FOR HEAVY METALS DISCHARGED INTO MUN WW COLLECTION& TREATMENT SYSTEMS	MINEAR, ROGER A.	80560601	NEW	77/09/30	$48,813
VANDERBILT UNIV. NASHVILLE	METABOLISM & TOXIC EFFECTS OF DITHIOCARBAMATE FUNGICIDES IN THE RAT	NEAL, R.	80391403	CONT	77/05/20	$48,609
** DEMONSTRATION **						
VELSICOL CHEMICAL CORP. MEMPHIS	CHLORINATED HYDROCARBON PESTICIDE REMOVAL FROM WASTEWATER	MARKS, DANIEL R.	80315901	INCR	77/06/27	$91,006
** FELLOWSHIPS **						
MEMPHIS STATE UNIV. MEMPHIS	M.S./ENVRN. ENGR.	ROBINSON, D.	91114901	NEW	77/09/15	$1,407

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
TEXAS						
** RESEARCH **						
BAYLOR COLLEGE OF MEDICINE HOUSTON	NEW&IMPROVED METHODS FOR QUANTITATIVE DETECTION ENTERIC VIRUSES IN POTABLE,RECLAIMED&NATURAL WATERS	MELNICK, JOSEPH L.	80273603	INCR	77/05/20	$90,000
BAYLOR COLLEGE OF MEDICINE HOUSTON	MOVEMENT & FATE OF VIRUSES & ORGANIC POLLUTANTS IN GROUND WATER DURING LAND TREATMENT OF WASTEWATER	GERBA, C.	80529201	NEW	77/06/21	$149,557
NORTH TEXAS STATE UNIV. DENTON	IDENTIFICATION OF CHLORINATED ORGANIC COMPOUNDS FORMED DURING WASTEWATER CHLORINATION	GLAZE, W.	80300703	INCR	77/04/08	$54,188
NORTH TEXAS STATE UNIV. DENTON	OXIDATION OF WATER SUPPLY REFRACTORY SPECIES BY OZONE WITH ULTRAVIOLET RADIATION	GLAZE, W.	80464002	CONT	77/08/10	$88,914
SOUTHWEST RES. INST. SAN ANTONIO	ENVIRONMENTAL MONITORING OF A WWT PLANT	JOHNSON, DONALD E.	80553301	NEW	77/09/19	$59,684
SOUTHWEST RES. INST. SAN ANTONIO	THE 1978 EPA/SHWRD HAZARDOUS WASTE MGMT. SYMPOSIUM	SHULTZ,D. W.	80554401	NEW	77/08/23	$30,606
TEXAS A&M RES FDN COLLEGE STATION	STRUCTURE & REACTIVITY OF ADSORBED OXIDES OF SULFUR	LUNSFORD, JACK H.	80113606	INCR	77/04/21	$10,000
TEXAS A&M RES. FDN. COLLEGE STATION	COLLECTION AND ASSESSMENT OF SUB MICRON PARTICULATE MATTER	MCFARLAND, A. R.	80419002	CONT	77/08/30	$20,000
			80419002	INCR	77/09/20	$10,000
TEXAS A&M RES. FDN. COLLEGE STATION	PYROGENIC ACTIVITY OF CARBON-FILTERED WATERS	WOLF, HAROLD W.	80442002	CONT	77/06/27	$58,999

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** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
TEXAS A&M RES. FDN. COLLEGE STATION	DEVELOPMENT AND STANDARIZATION OF IDENTIFICATION AND MONIORING TECHNIQUES FOR BACULOVIRUS PESTICIDES	SUMMERS, M.	80523201	NEW	77/05/23	$74,510
TEXAS A&M RES. FDN. COLLEGE STATION	EFFECTS OF DRILLING FLUIDS AND OIL IN CORALS OCCUPYING HARD BANK COMMUNITIES	BRIGHT, T.	80544101	NEW	77/07/01	$22,561
TEXAS A&M RES. FDN. COLLEGE STATION	SOIL DISPOSAL OF API PIT WASTES	BROWN, K.	80547401	NEW	77/09/12	$120,675
TEXAS SOUTHERN UNIV. HOUSTON	COMPARATIVE STUDY NITROGEN OXIDE ELECTRODE&SOLID STATE NITRATE ELECTRODE FOR DETERMINATION OF NITRAT	WILSON, RAY F.	80521201	NEW	77/09/21	$47,880
TEXAS, UNIV. OF AUSTIN	AEROSOL DYNAMICS	BROCK, J.	80366003	CONT	77/06/15	$50,000
TEXAS, UNIV. OF AUSTIN	REACTIONS OF SULFUR DIOXIDE IN AEROSOLS	HIMMELBLAU, DAVID M.	80381402	INCR	77/05/12	$20,000
TEXAS, UNIV. OF SAN ANTONIO	HUMAN ENTERIC VIRUS SURVIVAL IN SOIL FOLLOWING IRRIGATION WITH SEWAGE PLANT EFFLUENTS	SAGIK, B.	80384403	CONT	77/08/01	$112,050
TEXAS, UNIV. OF SAN ANTONIO	DEVELOPMENT OF FIELD VIRUS CONCENTRATION TECHNOLOGY	SORBER, C. A.	80447401	INCR	77/05/02	$43,000
TEXAS, UNIV. OF RICHARDSON	PROCEDURE FOR EVALUATION OF POTENTIAL GROUNDWATER CONTAMINATION BY HAZARDOUS CHEMICALS	LEE, G.	80454902	CONT	77/07/27	$80,000
TEXAS, UNIV. OF GALVESTON	COMBINED TESTING PROTOCOL FOR DETECTING ENVRN. MUTAGENCI AGENTS	LEGATOR, MARVIN S.	80462101	INCR	77/04/21	$14,696

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	T E X A S					
** RESEARCH **						
TEXAS, UNIV. OF GALVESTON	COMBINE TESTING PROTOCOL FOR DETECTING ENVRN. MUTAGENIC AGENTS	LEGATOR, M.	80462102	CONT	77/09/30	$115,000
TEXAS, UNIV. OF SAN ANTONIO	DESIGN OF EXPERIMENTS, STATISTICAL ANALYSES & EVALUATION OF AQUATIC RESEARCH DATA	DOMEY, R. G.	80500701	INCR	77/09/12	$45,675
TEXAS, UNIV. OF AUSTIN	TRACE & POTENTIALLY TOXIC ELEMENTS ASSOCIATED WITH URANIUM DEPOSITS IN SOUTH TEXAS	GROAT, CHARLES	80514701	NEW	77/05/10	$60,000
TEXAS, UNIV. OF AUSTIN	PREDICTING RESPONSE OF NATURAL SYSTEM TO URANIUM EXTRACTION	GALLOWAY, W. E.	80535701	NEW	77/08/30	$105,347
** DEMONSTRATION **						
GULF COAST WASTE DISPOSAL AUTH HOUSTON	OPTIMIZATION OF OPERATION OF SYSTEM OF SMALL TREATMENT PLANTS	DANIEL, WILLIAM K.	80485001	INCR	77/04/14	$45,780
** TRAINING **						
NORTH TEXAS STATE UNIV. DENTON	GRADUATE TRAINING IN THE MICROBIOLOGY OF WATER & WASTEWATER	SILVEY, J. K. G.	90011504	INCR	77/08/30	$23,800
TEXAS A&M UNIV. COLLEGE STATION	TRAINING IN WWT & AQUATIC SYSTEM MANAGEMENT	HANN, ROY W.	90012904	INCR	77/09/14	$27,200
TEXAS A&M UNIV. COLLEGE STATION	STAFF GUIDE DEVELOPMENT PROJECT GRANT	HOLBERT, L. R.	90071601	NEW	77/09/15	$19,500
TEXAS DEPT. OF HEALTH RESOURCES AUSTIN	TRAINING GRANT WATER SUPPLY STATE AGENCY	FOSTER, C. K.	90074301	NEW	77/09/19	$5,200

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	TEXAS					
** TRAINING **						
TEXAS ENVRN. COALITION AUSTIN	UNDERGROUND INJECTION WELLS: PROGRAM FOR PUBLIC UNDERSTANDING OF PROBLEM & REMEDIES	HIGGINS, B.	90073201	NEW	77/09/14	$22,000
TEXAS, UNIV. OF AUSTIN	TRAINING IN WATER SUPPLY AND POLLUTION CONTROL	MALINA, J.	90010708	INCR	77/09/08	$31,500
TEXAS, UNIV. OF AUSTIN	GRADUATE TRAINING IN AIR POLLUTION	COOPER, H.	90068001	NEW	77/07/28	$28,000
WILLIAM MARSH RICE UNIV. HOUSTON	WATER SUPPLY & POLLUTION CONTROL	WARD, C. H.	90017507	INCR	77/05/20	$170,663
** FELLOWSHIPS **						
HOUSTON, UNIV. OF HOUSTON	M.S./ENVRN. MGMT.	ANDERSON, RICHARD L.	91094901	INCR	77/06/13	$1,463
HOUSTON, UNIV. OF HOUSTON	M. S./ENVRN. MGMT.	KELLEY, J.	91100501	NEW	77/08/15	$1,486
HOUSTON, UNIV. OF HOUSTON	M.S./CHEMICAL ENGR.	KNAB, V.	91106501	NEW	77/07/29	$7,330
LAMAR UNIV. BEAUMONT	M.S./ENGR.-FULL TIME	THOMAS, GARY C.	91106401	NEW	77/08/10	$7,290
TEXAS, UNIV. OF AUSTIN	PH.D./ENVRN. HEALTH ENGR.	WAID, KENNETH R.	91042901	INCR	77/06/09	$731
TEXAS, UNIV. OF AUSTIN	M.S./CHEMICAL ENGR.	BILSKY, IRVIN L.	91070601	INCR	77/09/29	$838

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NU	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
T E X A S						
** FELLOWSHIPS **						
TEXAS, UNIV. OF AUSTIN	M.S./ENVRN. HEALTH ENGR.	PENDELTON, D. R.	91070901	INCR	77/06/09	$960
TEXAS, UNIV. OF AUSTIN	M.S./ENVRN. HEALTH ENGR.	MAGEE, MICHAEL L.	91071001	INCR	77/06/14	$2,924
TEXAS, UNIV. OF AUSTIN	M.S./ENVRN. HEALTH ENGR.	DURRENBERGER, C. J.	91071101	INCR	77/06/09	$1,424
TEXAS, UNIV. OF AUSTIN	M. S./ENVRN. HEALTH ENGR.	DATTNER, STUART L.	91071201	INCR	77/06/09	$1,247
			91071201	INCR	77/09/30	$104
TEXAS, UNIV. OF AUSTIN	M.S./ENVRN. HEALTH ENGR.	CUNNINGHAM, JAMES E.	91071401	INCR	77/06/09	$144
TEXAS, UNIV. OF AUSTIN	M.S./ENVRN. HEALTH ENGR.	LEE, RICHARD P.	91071501	INCR	77/06/09	$355
TEXAS, UNIV. OF AUSTIN	M.S./ENVRN. HEALTH ENGR.	SCHRAUFNAGEL, P. K.	91071701	INCR	77/06/09	$1,308
TEXAS, UNIV. OF AUSTIN	M.S./ENGR.	LAMBETH, BRYAN W.	91079201	INCR	77/06/21	$336
TEXAS, UNIV. OF AUSTIN	M.S./CIVIL ENGR.	LAIRD, A. R.	91082901	INCR	77/05/20	$270

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	T E X A S					
** FELLOWSHIPS **						
TEXAS, UNIV. OF AUSTIN	M.S./ENVRN. HEALTH ENGR.	SCHULTZ, ROBERT	91107201	NEW	77/07/29	$2,911
TEXAS, UNIV. OF ARLINGTON	M.S./CIVIL ENGR.	COLE, P.	91114801	NEW	77/09/12	$4,200

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	U T A H					
** RESEARCH **						
UTAH STATE DIVISION OF HEALTH SALT LAKE CITY	AIR QUALITY MONITORING ENERGY AREAS	LYMAN OLSEN, DIR. OF H	00813803	CONT	77/09/30	$30,000
UTAH STATE UNIV. LOGAN	MONITORING INSECT POPULATIONS IN UTAH ALFALFA TO MODIFY CONTROL PRACTICES	DAVIS, D.	80531901	NEW	77/06/27	$25,000
** DEMONSTRATION **						
UTAH STATE DIVISION OF HEALTH SALT LAKE CITY	SOLID WASTE DEMONSTRATION PROJECT IMPROVEMENT	LYMAN OLSEN, DIRECTOR	00816201	INCR	77/06/30	$30,000
** TRAINING **						
UTAH STATE DIVISION OF HEALTH SALT LAKE CITY	WATER SUPPLY TRAINING GRANT	HANSEN, R.	90072001	NEW	77/09/09	$5,200
UTAH STATE UNIV. LOGAN	GRADUATE TRAINING PROGRAM IN RURAL & AGRICULTURAL WATER QUALITY MANAGEMENT	JONES, NORMAN B.	90006906	INCR	77/08/19	$15,494
** FELLOWSHIPS **						
UTAH STATE UNIV. LOGAN	M.S./CIVIL ENGR	THOMAS, W.	91063101	INCR	77/08/10	$1,400
UTAH STATE UNIV. LOGAN	M.S./ENGR.	GEORGESON, MICHAEL B.	91086501	INCR	77/08/15	$1,400
UTAH STATE UNIV. LOGAN	M.S./ENVRN. ENGR.	ROBERTS, R. L.	91086801	INCR	77/09/14	$2,506
UTAH STATE UNIV. LOGAN	M.S./ENVRN. ENGR.-PART TIME	SPERLING, ROBERT A.	91090701	INCR	77/08/15	$1,400

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
U T A H						
** FELLOWSHIPS **						
UTAH, UNIV. OF SALT LAKE CITY	M. S./ENGR. ADMIN.	WATANABE, ALYSIA	91081101	INCR	77/06/14	$2,199
UTAH, UNIV. OF SALT LAKE CITY	B.S./ENVRN. SCIENCE	JORGENSEN, KAREN J.	91092201	INCR	77/06/09	$3,014

V E R M O N T

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
VERMONT, UNIV. OF BURLINGTON	FEASIBILITY STUDY FOR AN ASBESTOS AEROSOL MONITOR	DETENBECK, R.	80456202	CONT	77/06/16	$20,076
** DEMONSTRATION **						
CASTLETON, TOWN OF CASTLETON	LAKE BOMOSEEN WATER QUALITY IMPROVEMENT PROJECT	CLERKIN, J.	80524501	NEW	77/06/14	$74,640
VERMONT AGCY OF ENVRN CONSERV MONTPELIER	SOLID WASTE DEMO & RESOURCE RECOVERY SYSTEM GRANT	DR MARTIN L JOHNSON	00111601	INCR	77/06/22	$35,000
** TRAINING **						
VERMONT STATE DEPT. OF HEALTH BURLINGTON	PUBLIC WATER SYSTEMS OPERATOR TRAINING PROGRAM	STONE, KENNETH	90070901	NEW	77/09/20	$20,000
VERMONT STATE DEPT. OF HEALTH BURLINGTON	TRAINING PROGRAM FOR EMPLOYEES OF STATE PUBLIC WATER SYSTEM AGENCIES	STONE, K.	90073401	NEW	77/09/08	$5,200

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
V I R G I N I A						
** RESEARCH **						
HAMPTON INST. HAMPTON	MATRIX ISOLATION STUDIES INVOLVING THE OXIDATION OF SULFUR DIOXIDE	HUNTER, CHARLES E.	80351603	CONT	77/08/10	$26,388
MITRE CORP. MCLEAN	IDENTIFICATION OF TOXIC POLLUTANT DISCHARGES FOR UNIT PROCESSES	KING JOHN A.	80562001	NEW	77/09/20	$70,000
MITRE CORP. MCLEAN	NEUTRALIZATION/PRECIPITATION MANUAL OF PRACTICE	ELLERBUSCH, F.	80562301	NEW	77/09/23	$89,931
NORFOLK STATE COLLEGE NORFOLK	PHOTON CORRELATION IN LASER DOPPLER SPECTROSCOPY FOR THE IN SITU DETERMINATION OF PARTICULATE SIZE I	GEORGE, A.	80376502	CONT	77/07/13	$22,179
VIRGINIA INST. OF MARINE SCIENCE GLOUCESTER PT.	ASSESSMENT OF APPLICATION OF MULTIVARIATE ANALYSES IN ECOLOGICAL INVESTIGATIONS OF WATER POLLUTION	BOESCH, DONALD F.	80412701	INCR	77/09/27	$105,000
VIRGINIA INST. OF MARINE SCIENCE GLOUCESTER POINT	DELINEATION OF COASTAL MARSH BOUNDARIES - CENTRAL ATLANTIC	BOON, JOHN D.	80494701	INCR	77/06/24	$1,800
VIRGINIA INST. OF MARINE SCIENCE GLOUCESTER POINT	THE ROLE OF SEDIMENTS IN THE STORAGE, MOVEMENT & BIOLOGICAL UPTAKE	HUGGETT, ROBERT J.	80499301	INCR	77/06/13	$100,000
VIRGINIA POLYTECHNIC INST. BLACKSBURG	VENTILATORY RESPONSES OF FISH TO FLUCTUATING APPLICATIONS OF TOXICANTS	CAIRNS, J.	80527401	NEW	77/06/17	$49,525
VIRGINIA POLYTECHNIC INST. BLACKSBURG	CONTINUOUS BIOREACTOR FOR REGENERATION OF ACTIVATED CARBON	DREW, S.	80537301	NEW	77/06/14	$10,316
VIRGINIA UNIV. MEDICAL COLLEGE RICHMOND	STUDY OF PATHOGENIC FREE-LIVING AMEBAS IN FRESH WATER LAKES IN VIRGINIA	DUMA, R.	80501402	CONT	77/09/20	$75,056

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
V I R G I N I A						
** RESEARCH **						
VIRGINIA, COMMONWEALTH OF RICHMOND	DEVELOP INCINERATOR OPERATING CONDITIONS NECESSARY FOR KEPONE CONTAMINATE SLUDGE DISPOSAL	BARTSCH, ERIC H.	80511201	INCR	77/08/05	$50,000
VIRGINIA, UNIV. OF CHARLOTTESVILLE	SULFUR DIOXIDE OXIDATION IN SCRUBBER SYSTEMS	HUDSON, J. L.	80522701	NEW	77/04/22	$79,641
WILLIAM & MARY COLLEGE WILLIAMSBURG	STANDARDS FOR & METHODS OF ANALYSIS OF RAINWATER FOR ACIDITY	TYREE, S. Y.	80499801	INCR	77/09/12	$25,368
** DEMONSTRATION **						
RIVANNA WATER & SEWER & AUTH CHARLOTTESVILLE	RIVANNA RESERVOIR RESTORATION PROJECT	WILLIAMS, GEORGE W.	80494901	INCR	77/09/15	$24,917
** TRAINING **						
CITIZENS PROGRAM FOR CHESAPEAKE BAY BLACKBURG	PUBLIC PARTICIPATION & TRAINING PROCESS FOR WATER QUALITY PLANNING & MGMT.	HAGERMAN, G.	90074801	NEW	77/09/26	$248,158
URBAN ENVRN. STUDIES CENTER ARLINGTON	OUR URBAN ENVRN.: MOST ENDANGERED SPECIES	GRAY, C.	90076101	NEW	77/09/20	$7,500
VIRGINIA POLY. INST. & STATE UNIV. BLACKSBURG	WATER RESOURCES MANAGEMENT & QUALITY CONTROL	KING, PAUL H.	90033308	INCR	77/09/02	$18,500
VIRGINIA STATE AIR POLLUTION CONTR. BD FALLS CHURCH	STAPPA 6TH MOTOR VEHICLE EMISSION CONTROL CONFERENCE	ALEXANDER, JAMES T.	90075501	NEW	77/09/29	$4,408
VIRGINIA STATE DEPT OF HEALTH RICHMOND	WATER SUPPLY STATE AGENCY TRAINING GRANT	TAYLOR, R. B.	90073801	NEW	77/09/14	$5,200

VIRGINIA

** FELLOWSHIPS **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
VIRGINIA COMMONWEALTH UNIV. RICHMOND	B. S./COMPUTER SCIENCE	MACE, RHONDA G.	91106201	NEW	77/08/15	$2,930
VIRGINIA COMMONWEALTH UNIV. RICHMOND	CERTIFICATION IN INFO. SYS.	FORTNER, LIMON E.	91107501	NEW	77/08/10	$2,170
VIRGINIA POLYTECHNIC INST.&STATE UNIV. BLACKSBURG	M.S./ENVRN. SCIENCE & ENGR.	JACKSON, PATRICIA A.	91115501	NEW	77/09/23	$2,878
VIRGINIA, UNIV. OF CHARLOTTESVILLE	M. S. /CHEM. ENGR.	NURMI, D.	91099501	NEW	77/08/10	$7,968

W A S H I N G T O N

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
SEATTLE, CITY OF SEATTLE	SEATTLE TOLT WATER SUPPLY MIXED ASBESTOSFORMS REMOVAL STUDY	KIRMEYER, G.	80442202	CONT	77/05/12	$66,881
SEATTLE, MUN. OF METRO. SEATTLE	FERTILIZER EVALUATION OF DEWATERED SOLVENT DRIED MUN. SLUDGE	VARNI, M.	80558401	NEW	77/09/12	$92,930
SEATTLE, MUN. OF METRO. SEATTLE	FATE & EFFECTS OF SEDIMENTS FROM COMBINE SEWER & STORM DRAIN OVERFLOWS IN SEATTLE NEAR SHORE WATER	VARNI, M.	80560201	NEW	77/09/23	$130,000
WASHINGTON STATE UNIV. PULLMAN	MEASUREMENT OF TROPOSPHERIC HALOCARBONS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY	CRONN, D.	80403303	CONT	77/04/14	$70,000
WASHINGTON STATE UNIV. PULLMAN	SYNOPTIC METEOROLOGY & AIR QUALITY PATTERNS IN THE ST. LOUIS RAPS PROGRAM	ROBINSON, E.	80514201	NEW	77/04/22	$15,442
WASHINGTON STATE UNIV. PULLMAN	EXPERIMENTAL DETERMINATION OF "DRY DEPOSITION" RATES	ROBINSON, E.	80534201	NEW	77/06/21	$40,000
WASHINGTON STATE UNIV. PULLMAN	RURAL OXIDANT STUDIES & THE ROLE OF NOX IN RURAL OXIDANT FORMATION	WESTBERG, H.	80534301	NEW	77/05/20	$104,908
WASHINGTON STATE UNIV. PULLMAN	AMBIENT HYDROCARBON AND OZONE MEASUREMENTS NEAR A REFINERY	WESTBERG, H.	80537601	NEW	77/08/05	$78,961
WASHINGTON STATE UNIV. PULLMAN	ON FARM IMPROVEMENTS TO REDUCE SEDIMENT AND NUTRIENTS IN IRRIGATION RETURN FLOW	KING, L.	80552701	NEW	77/09/09	$287,703
WASHINGTON, UNIV. OF SEATTLE	OPTICAL EFFECTS OF ATMOSPHERIC AEROSOL	WAGGONER, ALAN P.	80066513	CONT	77/08/25	$35,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD

W A S H I N G T O N

**** RESEARCH ****

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
			80066513	INCR	77/09/12	$89,913
WASHINGTON, UNIV. OF SEATTLE	REHABILITATION EFFECTS IN LONG LAKE, WASHINGTON	WELCH, EUGENE B.	80458801	INCR	77/06/24	$68,500
WASHINGTON, UNIV. OF SEATTLE	INDENTIFICATION AND PREVALENCE OF YERSINIA ENTEROCOLITICA IN WASH. STATE WATER SUPPLIES	BALDWIN, D. R.	80531301	NEW	77/05/20	$41,504
WASHINGTON, UNIV. OF SEATTLE	EXAMINATION OF MORTALITY DATA FROM SKIN TUMORS IN THE U. S.	LEE, J.	80536301	NEW	77/06/03	$11,567
			80536301	INCR	77/09/14	$6,679
WASHINGTON, UNIV. OF SEATTLE	INTERACTIONS OF ACID SULFATES & THE RESPIRATORY SYSTEM	FRANK, R.	80537801	NEW	77/08/29	$284,900
WASHINGTON, UNIV. OF SEATTLE	ENDOCRINOLOGIC AND REPRODUCTIVE STATES OF BIRD POPULATIONS UNDER ENVRN. STRESS	FARMER, DONALD S.	80540901	NEW	77/07/08	$29,031
WASHINGTON, UNIV. OF SEATTLE	RESTORATION OF MOSES LAKE BY DILUTION	WELCH, E.	80543001	NEW	77/07/25	$110,000

**** DEMONSTRATION ****

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
BOEING COMMERCIAL AIRPLANE CO. SEATTLE	SULFIDE PRECIPITATION OF HEAVY METALS	TERHUNE, C.	80541301	NEW	77/08/29	$93,458
MEDICAL LAKE, TOWN OF MEDICAL LAKE	RESTORATION ANALYSIS & REHABILITATION OF MEDICAL LAKE	GILBRETH, F.	80472801	INCR	77/05/12	$50,569

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
W A S H I N G T O N						
** DEMONSTRATION **						
PACIFIC WOOD TREATING CORP. RIDGEFIELD	WOOD TREATING WASTE RECYCLE SYSTEM	SHUM, A.	80517901	NEW	77/06/17	$50,000
** TRAINING **						
GREEN RIVER COMMUN. COLLEGE AUBURN	STAFF GUIDE DEVELOPMENT PROJECT GRANT	DELVECCHIO, F.	90071301	NEW	77/09/15	$14,200
WASHINGTON, UNIV. OF SEATTLE	PROFESSIONAL TRAINING IN WATER SUPPLY & POLLUTION CONTROL	SYLVESTER, ROBERT O.	90031305	INCR	77/09/09	$25,900
** FELLOWSHIPS **						
SEATTLE UNIV. SEATTLE	M.S./PUBLIC SERVICE	HARLAN, S. F.	91111701	NEW	77/08/29	$4,200
WASHINGTON STATE UNIV. PULLMAN	M. S./ENVRN. ENGR.	NEIL, PAUL E.	91105501	NEW	77/08/10	$9,676

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	W E S T V I R G I N I A					
** RESEARCH **						
WEST VIRGINIA UNIV. MORGANTOWN	CALIBRATION OF 90 - NOTCH WEIRS USING PARAMETERS OTHER THAN WEIR HEAD	ELI, R.	80531201	NEW	77/06/17	$22,328
WEST VIRGINIA UNIV. MORGANTOWN	OHIO RIVER BASIN ENERGY STUDY: PHASE II	CARDI, V.	80558501	NEW	77/09/22	$80,000
** FELLOWSHIPS **						
WEST VIRGINIA COLLEGE GRAD. STUDIES INSTITUTE	M.S./ENVRN. ENGR.	EVANS, R.	91073301	INCR	77/09/08	$1,527
WEST VIRGINIA COLLEGE GRADUATE STUDIES INSTITUTE	M.S./ENVRN. STUDIES	EDWARDS, H.	91070701	INCR	77/09/12	$1,293

W I S C O N S I N

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
DEPARTMENT OF NATURAL RESOURCES MADISON	WI STATE PROGRAM FOR WATER POL CONTROL	THOMAS A KROEHN ADMINI	00533201	NEW	77/09/30	$20,000
INSTITUTE OF PAPER CHEMISTRY APPLETON	ANALYSIS OF ACUTELY TOXIC COMPOUNDS IN PULP & PAPER DISCHARGE	WILLEY, AVERILL J.	80352501	INCR	77/05/02	$24,150
INSTITUTE OF PAPER CHEMISTRY APPLETON	COLOR REMOVAL FROM NSSC EFFLUENTS BY ULTRAFILTRATION	DUGAL, H.	80550201	NEW	77/08/29	$25,000
KENOSHA, CITY OF KENOSHA	FULL & PILOT SCALE EVALUATION & OPTIMIZATION OF THE ANAEROBIC SLUDGE DIGESTION PROCESS	NELSON, D. F.	80488901	NEW	77/09/08	$129,261
WISCONSIN DNR MADISON	MENOMONEE RIVER WATERSHED STUDY OF MAJOR & TRACE CONSTITUENTS	JOHN KONRAD SUPV.	00514201	INCR	77/06/17	$66,869
WISCONSIN, UNIV. OF MADISON	MECHANISMS OF PESTICIDE DEGRADATION	BOUSH, G.	80106013	CONT	77/04/01	$51,808
WISCONSIN, UNIV. OF MADISON	IMPACT OF COAL FIRED POWER PLANTS ON THE ENVRN.	LOUCKS, ORIE	80397103	CONT	77/08/15	$620,991
			80397103	INCR	77/09/14	$145,000
WISCONSIN, UNIV. OF MADISON	NUTRITIONAL ECOLOGY OF GREAT LAKES CLADOPHORA SP.	GERLOFF, G.	80440202	CONT	77/04/22	$37,456
WISCONSIN, UNIV. OF MADISON	DEVELOPMENT OF STANDARD LEACHING TEST	HAM, ROBERT K.	80477301	INCR	77/06/10	$39,484

W I S C O N S I N

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
** RESEARCH **						
WISCONSIN, UNIV. OF SUPERIOR	DEVELOPMENT OF BIOASSAY PROCEDURES FOR DEFINING POLLUTION OF HARBOR SEDIMENTS	BAHNICK, DONALD A.	80491801	INCR	77/04/28	$65,000
			80491801	INCR	77/09/21	$4,940
WISCONSIN, UNIV. OF MADISON	PHOSPHORUS INTERNAL LOADING IN SHAGAWA LAKE	ARMSTRONG, D.	80528101	NEW	77/06/03	$100,000
WISCONSIN, UNIV. OF MADISON	DESIGN & MANAGEMENT OF SUBSURFACE SOIL ABSORPTION SYSTEMS	BOYLE, W.	80553101	NEW	77/09/20	$180,651
** TRAINING **						
MARQUETTE UNIV. MILWAUKEE	TRAINING IN WATER POLLUTION CONTROL & ENVRN. ENGR.	KIPP, RAYMOND J.	90001409	INCR	77/09/14	$21,500
WISCONSIN STATE DEPT NATURAL RESOURCES MADISON	COMMUNICATION & TRAINING FOR WATER SUPPLY	BAUMEISTER, ROBERT	90075001	NEW	77/09/29	$4,166
WISCONSIN, UNIV. OF MADISON	PROFESSIONAL TRAINING IN ANALYSIS & DESIGN OF WATER SUPPLY & POLLUTION CONTROL SYSTEMS	POLKOWSKI, LAWRENCE	90016605	INCR	77/09/27	$30,104
** FELLOWSHIPS **						
WISCONSIN, UNIV. OF MADISON	M. S./MECH. ENGR.	ESTRADA, EMILIA Y.	91079601	INCR	77/06/09	$3,190
WISCONSIN, UNIV. OF MADISON	M.S./WATER RESOURCES MGMT.-PART TIME	PERSSON, L.	91087601	INCR	77/08/02	$2,050

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
W I S C O N S I N						
** FELLOWSHIPS **						
WISCONSIN, UNIV. OF MADISON	M.S./WATER RESOURCES-PART TIME	LEWIS, J.	91089601	INCR	77/08/02	$1,050
WISCONSIN, UNIV. OF MADISON	SANITARY ENGR.	THORSEN, JOHN W.	91112601	NEW	77/08/16	$2,200

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD

W Y O M I N G

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
WYOMING DEPT OF ENVIR QUAL. CHEYENNE	THIS PROJECT WILL RESULT IN COLLECTION OF AMBIENT AIR BASE LINE DATA IN ENERGY.	ROBERT SUNDIN, DIRECTO	00812303	CONT	77/09/30	$43,000
WYOMING, UNIV. OF LARAMIE	THE IMPORTANCE & FUNCTIONS OF ALLUVIAL VALLEY FLOURS	RECHARD, P. A.	80518501	NEW	77/06/17	$109,970

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	G U A M					
** TRAINING **						
GUAM, P.U.A. OF AGANA	OFF ISLAND TRAINING FOR STP OPERATORS	J. C. FEJERAN	00914101	NEW	77/09/16	$15,000

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	FOREIGN COUNTRIES CANADA					
** RESEARCH **						
B. C. RESEARCH VANCOUVER	DEVELOPMENT OF CHEMICAL TOXICITY ASSAY FOR PULP MILL EFFLUENTS	LEACH, J. M.	80497701	INCR	77/04/21	$61,200
CHARLES HOWARD & ASSOC., LTD. WINNIPEG	STORM & COMBINED SEWER STORAGE TREATMENT THEORY COMPARED TO COMPUTER SIMULATION	HOWARD, C. D.	80510901	NEW	77/09/14	$6,000
DORSCH CONSULT LIMITED TORONTO	QUANTITY QUALITY SIMULATION - A DETAILED SIMULATION FOR URBAN RUNOFF CONTROL	GEIGER, W. F.	80510001	NEW	77/07/29	$16,500
TORONTO, UNIV. OF TORONTO	STUDY OF THE MECHANISM AND RATES OF VOLATILIZATION OF CONTAMINANTS FROM WATER BODIES	MACKAY, D.	80515001	NEW	77/07/26	$60,000

FOREIGN COUNTRIES

FRANCE

** RESEARCH **

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
SCIENTIFIC COMMITTEE PROBLEMS ENVRN. PARIS	EVALUATION OF EXISTING GROUND-WATER BASIN MANAGEMENT MODELS	MALONE, THOMAS F.	80371301	INCR	77/06/28	$85,806

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	FOREIGN COUNTRIES GERMANY					
** RESEARCH **						
INSTITUT FUR AEROBIOLOGIE SCHMALLENBERG	DESIGN & PERFORMANCE OF AEROSOL MASS DISTRIBUTION MONITOR	STOBER, W.	8U359202	INCR	77/09/23	$38,875

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	FOREIGN COUNTRIES ISRAEL					
** RESEARCH **						
HEBREW UNIV. JERUSALEM	DEVELOPMENT OF METHODS FOR THE DETECTION & INACTIVATION OF VIRUSES IN VARIOUS WATERS	SHUVAL, H. I.	80351003	CONT	77/05/26	$60,000
HEBREW UNIV. JERUSALEM	EPIDEMIOLOGICAL STUDY OF DISEASE ASSOCIATED WITH WASTEWATER SPRINKLER IRRIGATION	SHUVAL, H.	80517401	NEW	77/07/26	$73,580

APPLICANT MUNICIPALITY	TITLE	PROJECT DIRECTOR / FELLOW	GRANT NO	TYPE OF GRANT	DATE OF AWARD	AMOUNT OF GRANT AWARD
	FOREIGN COUNTRIES YUGOSLAVIA					
** RESEARCH **						
INSTITUTE FOR MEDICAL RESEARCH ZAGREB	TOXICOLOGY OF PESTICIDES	REINER, E.	80453902	CONT	77/06/20	$25,000

SECTION II

GRANT NUMBER	STATE	PROGRAM	APPLICANT
800397-050	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
800665-130	WA	RESEARCH	WASHINGTON, UNIV. OF
800665-131	WA	RESEARCH	WASHINGTON, UNIV. OF
800916-051	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
800938-011	NY	RESEARCH	BROOKLYN POLYTECHNIC INST.
801060-130	WI	RESEARCH	WISCONSIN, UNIV. OF
801136-062	TX	RESEARCH	TEXAS A&M RES FDN
801301-054	MN	RESEARCH	MINNESOTA, UNIV. OF
802037-026	MA	DEMONSTRATION	WOODS HOLE OCEANOGRAPHIC INST.
802160-043	CA	RESEARCH	CALIFORNIA INST. OF TECH.
802411-024	FL	RESEARCH	FLORIDA, UNIV. OF
802472-034	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
802511-033	PA	RESEARCH	DREXEL UNIVERSITY
802736-033	TX	RESEARCH	BAYLOR COLLEGE OF MEDICINE
802759-035	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
802759-034	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
802914-034	MN	RESEARCH	MINNESOTA, UNIV. OF
802914-033	MN	RESEARCH	MINNESOTA, UNIV. OF
803007-033	TX	RESEARCH	NORTH TEXAS STATE UNIV.
803078-034	IL	RESEARCH	IIT RESEARCH INST.
803079-040	MT	RESEARCH	MONTANA STATE UNIV.
803090-040	OR	RESEARCH	OREGON STATE UNIV.
803115-032	MO	RESEARCH	WASHINGTON UNIVERSITY
803157-015	IL	DEMONSTRATION	AMERICAN PUBLIC WORKS ASSOC.
803159-014	TN	DEMONSTRATION	VELSICOL CHEMICAL CORP.
803191-014	PA	DEMONSTRATION	PENNSYLVANIA, COMMONWEALTH OF
803218-018	OK	RESEARCH	OKLAHOMA STATE DEPT. OF HEALTH
803242-031	MA	RESEARCH	MASSACHUSETTS INST OF TECH
803291-040	MI	RESEARCH	MICHIGAN, UNIV. OF
803510-030	FC	RESEARCH	HEBREW UNIV.
803516-030	VA	RESEARCH	HAMPTON INST.
803524-022	ID	RESEARCH	IDAHO, UNIV. OF
803525-016	WI	RESEARCH	INSTITUTE OF PAPER CHEMISTRY
803560-030	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
803561-030	DC	RESEARCH	HOWARD UNIV.
803566-030	MT	RESEARCH	NORTHERN CHEYENNE TRIBAL COUNCIL
803566-031	MT	RESEARCH	NORTHERN CHEYENNE TRIBAL COUNCIL
803592-021	FC	RESEARCH	INSTITUT FUR AEROBIOLOGIE
803593-030	PA	RESEARCH	AMERICAN SOCIETY FOR TESTING&MATERIALS
803602-030	MN	DEMONSTRATION	ST. PAUL METRO. WASTE CONTROL COMM
803603-022	CA	RESEARCH	CALIFORNIA, UNIV. OF
803611-012	MN	RESEARCH	ENVIRONMENTAL RESEARCH INST. OF MI.
803612-020	LA	RESEARCH	LOUISIANA STATE UNIV.
803631-021	MA	RESEARCH	HARVARD UNIV.
803634-020	NY	RESEARCH	CORNELL UNIV.
803637-020	MD	RESEARCH	CHARLES CNTY. COMMUN. COLLEGE
803645-030	CO	RESEARCH	COLORADO, UNIV. OF
803650-020	LA	RESEARCH	SOUTHERN UNIV.
803651-022	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
803656-014	PA	DEMONSTRATION	MATLACK, INC.
803660-030	TX	RESEARCH	TEXAS, UNIV. OF
803680-030	NY	RESEARCH	MANHATTAN COLLEGE

GRANT NUMBER	STATE	PROGRAM	APPLICANT
803691-030	NY	RESEARCH	CORNELL UNIV.
803692-030	FL	RESEARCH	FLORIDA, UNIV. OF
803712-030	MA	RESEARCH	MASSACHUSETTS, UNIV. OF
803713-013	FC	RESEARCH	SCIENTIFIC COMMITTEE PROBLEMS ENVRN.
803722-014	CA	RESEARCH	HYDROCOMP, INC.
803724-020	SC	DEMONSTRATION	SOUTH CAROLINA, UNIV. OF
803727-030	MT	RESEARCH	MONTANA STATE UNIV.
803738-030	MA	RESEARCH	MASSACHUSETTS INST. OF TECH.
803754-021	MI	RESEARCH	MICHIGAN, UNIV. OF
803735-013	OK	RESEARCH	OKLAHOMA ST. UNIV.
803762-021	NJ	RESEARCH	RUTGERS UNIV./COOK COLLEGE
803764-030	NC	RESEARCH	SAINT AUGUSTINE COLLEGE
803765-020	VA	RESEARCH	NORFOLK STATE COLLEGE
803785-030	MI	RESEARCH	MICHIGAN STATE UNIV.
803788-030	CO	RESEARCH	COLORADO STATE UNIV.
803799-022	CA	RESEARCH	CALIFORNIA, UNIV. OF
803804-021	SD	RESEARCH	SOUTH DAKOTA STATE UNIV.
803805-022	IL	RESEARCH	IIT RESEARCH INST.
803814-022	TX	RESEARCH	TEXAS, UNIV. OF
803818-030	RI	RESEARCH	RHODE ISLAND, UNIV. OF
803827-021	NJ	RESEARCH	PRINCETON UNIV.
803828-013	ME	DEMONSTRATION	BANGOR, CITY OF
803833-030	MA	RESEARCH	BOSTON UNIV.
803835-030	AL	RESEARCH	AUBURN UNIV.
803838-022	NC	RESEARCH	DUKE UNIV.
803844-030	TX	RESEARCH	TEXAS, UNIV. OF
803846-031	CA	RESEARCH	STANFORD RESEARCH INST.
803846-030	CA	RESEARCH	STANFORD RESEARCH INST.
803851-031	MN	RESEARCH	MINNESOTA, UNIV. OF
803851-030	MN	RESEARCH	MINNESOTA, UNIV. OF
803856-020	NC	RESEARCH	DUKE UNIV.
803868-030	OH	RESEARCH	OHIO STATE UNIV.
803871-012	CO	RESEARCH	COLORADO, UNIV. OF
803873-012	CA	DEMONSTRATION	ORANGE CNTY WATER DIST.
803887-022	FL	RESEARCH	FLORIDA STATE UNIV.
803887-021	FL	RESEARCH	FLORIDA STATE UNIV.
803893-021	FL	RESEARCH	MIAMI, UNIV. OF
803893-030	FL	RESEARCH	MIAMI, UNIV. OF
803893-031	FL	RESEARCH	MIAMI, UNIV. OF
803896-020	MO	RESEARCH	WASHINGTON UNIV.
803896-021	MO	RESEARCH	WASHINGTON UNIV.
803902-030	RI	RESEARCH	RHODE ISLAND, UNIV. OF
803903-021	IA	RESEARCH	AMES, CITY OF
803910-012	CO	DEMONSTRATION	DENVER METRO SEWAGE DISPOSAL DIST #1
803913-030	CA	RESEARCH	CALIFORNIA, UNIV. OF
803914-030	TN	RESEARCH	VANDERBILT UNIV.
803922-030	AK	RESEARCH	ALASKA, UNIV. OF
803926-012	PA	DEMONSTRATION	APPLIED TECHNOLOGY ASSOCIATES, INC.
803931-020	CO	RESEARCH	BOULDER, CITY OF
803932-030	MN	RESEARCH	MINNESOTA, UNIV. OF
803945-030	AK	RESEARCH	ALASKA, UNIV. OF
803948-021	OR	RESEARCH	OREGON STATE UNIV.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
803950-022	CO	RESEARCH	COLORADO STATE UNIV.
803950-030	CO	RESEARCH	COLORADO STATE UNIV.
803952-031	MN	RESEARCH	MINNESOTA, UNIV. OF
803952-030	MN	RESEARCH	MINNESOTA, UNIV. OF
803953-021	GA	RESEARCH	GEORGIA INST. OF TECH.
803953-020	GA	RESEARCH	GEORGIA INST. OF TECH.
803965-030	IN	RESEARCH	PURDUE UNIV.
803971-030	WI	RESEARCH	WISCONSIN, UNIV. OF
803971-031	WI	RESEARCH	WISCONSIN, UNIV. OF
803978-013	NJ	RESEARCH	RUTGERS UNIVERSITY
803988-012	AZ	RESEARCH	ARIZONA, UNIV. OF
803997-012	FL	RESEARCH	FLORIDA, UNIVERSITY OF
804008-023	OH	RESEARCH	BATTELLE MEMORIAL INST.
804033-030	WA	RESEARCH	WASHINGTON STATE UNIV.
804123-030	MA	RESEARCH	MASSACHUSETTS INST. OF TECH.
804127-011	VA	RESEARCH	VIRGINIA INST. OF MARINE SCIENCE
804150-012	DC	RESEARCH	NATIONAL CENTER FOR RESOURCE RECOVERY
804162-012	CO	RESEARCH	COLORADO SCH OF MINES RES. INST.
804168-020	OH	RESEARCH	CHILDREN'S HOSPITAL RESEARCH FDN.
804174-020	MI	DEMONSTRATION	FORD MOTOR CO.
804190-021	TX	RESEARCH	TEXAS A&M RES. FDN.
804190-020	TX	RESEARCH	TEXAS A&M RES. FDN.
804201-020	OH	RESEARCH	OHIO STATE UNIV.
804202-021	OH	RESEARCH	CINCINNATI, UNIV. OF
804204-020	GA	RESEARCH	ATLANTA UNIV. CENTER
804205-020	CA	RESEARCH	CALIFORNIA, UNIV. OF
804215-014	CA	RESEARCH	CALIFORNIA, UNIV. OF
804215-013	CA	RESEARCH	CALIFORNIA, UNIVERSITY OF
804216-011	RI	RESEARCH	ROHDE ISLAND
804232-012	MI	DEMONSTRATION	INGHAM CNTY. BD. OF COMM.
804233-014	TN	RESEARCH	NASHVILLE THERMAL TRANSFER CORP.
804256-020	OH	RESEARCH	AKRON UNIV. OF
804294-020	PA	RESEARCH	SUSQUEHANNA UNIV.
804303-013	CO	RESEARCH	RESOURCES ADMIN. AND DEVELOPMENT
804307-020	MD	RESEARCH	JOHN HOPKINS UNIV.
804316-020	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804329-014	NC	RESEARCH	AMERICAN TEXTILE MANUFACTURING INST.
804329-013	NC	RESEARCH	AMERICAN TEXTILE MANUFACTURING INST.
804349-020	NY	RESEARCH	AGWAY INC.
804360-014	DC	DEMONSTRATION	INTERNATIONAL CITY MGMT ASSISTANT
804361-020	MN	RESEARCH	MINNESOTA, UNIV. OF
804366-020	CA	RESEARCH	CALIFORNIA, UNIV. OF
804367-015	DC	DEMONSTRATION	INSTITUTE OF INDUSTRIAL LAUNDERERS
804369-020	MI	RESEARCH	MICHIGAN, UNIV. OF
804375-020	FL	RESEARCH	FLORIDA STATE OFFICE OF HEALTH
804376-0 2	FL	RESEARCH	FLORIDA STATE UNIV.
804381-020	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804385-012	DC	RESEARCH	PUBLIC TECH. INC.
804394-020	NJ	RESEARCH	RUTGERS STATE UNIV.
804395-020	MO	RESEARCH	WASHINGTON UNIV.
804402-020	WI	RESEARCH	WISCONSIN, UNIV. OF
804416-020	GA	RESEARCH	GEORGIA INST. OF TECH.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
804420-020	TX	RESEARCH	TEXAS ARM RES. FDN.
804422-020	WA	RESEARCH	SEATTLE, CITY OF
804424-012	MI	RESEARCH	MICHIGAN STATE UNIV.
804427-020	OR	RESEARCH	OREGON STATE UNIV.
804429-011	AR	RESEARCH	ARKANSAS, UNIV. OF
804429-020	AR	RESEARCH	ARKANSAS, UNIV. OF
804430-020	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804431-020	CA	RESEARCH	STANFORD UNIV.
804433-011	CO	RESEARCH	AMERICAN WATER WORKS ASSOC. RES. FDN.
804440-020	GA	RESEARCH	ATLANTA UNIV.
804442-012	MI	RESEARCH	CRANBROOK INST. OF SCIENCE
804442-020	MI	RESEARCH	CRANBROOK INST. OF SCIENCE
804443-012	IN	RESEARCH	PURDUE RESEARCH FDN.
804444-020	MO	RESEARCH	MISSOURI, UNIV. OF
804450-013	CA	RESEARCH	TETRA TECH. INC.
804456-020	OR	RESEARCH	OREGON STATE UNIV.
804463-011	NY	RESEARCH	INTERSTATE SAN. COMM.
804470-011	GA	RESEARCH	CLARK COLLEGE
804474-011	TX	RESEARCH	TEXAS, UNIV. OF
804477-020	GA	RESEARCH	GEORGIA STATE UNIV.
804499-020	GA	RESEARCH	FORT VALLEY STATE COLLEGE
804503-012	MI	RESEARCH	MICHIGAN, UNIV. OF
804505-010	CO	DEMONSTRATION	STERLING COLORADO BEEF CO.
804509-020	NY	RESEARCH	CORNELL UNIV.
804511-020	PA	DEMONSTRATION	PENNSYLVANIA STATE DEPT ENVRN RESOURCE
804512-020	MN	RESEARCH	MINNESOTA, UNIV. OF
804512-030	AK	RESEARCH	ALASKA, UNIV. OF
804513-020	NY	RESEARCH	BOYCE THOMPSON INST.
804516-020	CA	RESEARCH	CALIFORNIA, UNIV. OF
804519-020	FL	RESEARCH	OHIO STATE UNIV. RES. FDN.
804521-012	FL	RESEARCH	DADE CNTY. DEPT PUBLIC HEALTH
804527-012	MS	RESEARCH	SOUTHERN MISSISSIPPI, UNIV. OF
804530-020	FL	RESEARCH	FLORIDA, UNIV. OF
804531-020	AL	RESEARCH	AUBURN UNIV.
804533-012	IA	RESEARCH	IOWA STATE UNIV.
804533-020	IA	RESEARCH	IOWA STATE UNIV
804536-014	DC	RESEARCH	SMITHSONIAN INST.
804539-020	FC	RESEARCH	INSTITUTE FOR MEDICAL RESEARCH
804541-012	FL	RESEARCH	WEST FLORIDA, UNIV. OF
804546-020	CA	RESEARCH	CALIFORNIA, UNIV. OF
804547-020	IN	RESEARCH	PURDUE UNIV.
804549-020	TX	RESEARCH	TEXAS, UNIV. OF
804562-020	VT	RESEARCH	VERMONT, UNIV. OF
804563-020	NY	RESEARCH	MANHATTAN COLLEGE
804568-020	KY	RESEARCH	KENTUCKY, UNIV. OF
804570-020	FL	RESEARCH	FLORIDA, UNIV. OF
804571-013	LA	RESEARCH	EAST JEFFERSON WATERWORKS DIST #1
804573-014	NY	RESEARCH	NEW YORK STATE UNIV RES. FDN
804573-020	NY	RESEARCH	NEW YORK STATE UNIV.
804577-020	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804587-020	ME	RESEARCH	MAINE, UNIV. OF
804588-012	WA	RESEARCH	WASHINGTON, UNIV. OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
804595-013	MT	RESEARCH	MONTANA COLLEGE OF MINERAL SCIENCE
804595-020	MT	RESEARCH	MONTANA TECH. ALUMNI. FDN.
804596-020	MD	RESEARCH	JOHNS HOPKINS UNIV.
804600-020	MN	RESEARCH	MINNESOTA, UNIV. OF
804606-020	CA	RESEARCH	LOMA LINDA UNIV.
804607-012	MI	RESEARCH	MICHIGAN, UNIV. OF
804608-020	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
804609-020	NY	RESEARCH	SYRACUSE RES. FDN.
804611-020	FL	RESEARCH	MIAMI, UNIV. OF
804612-012	OH	RESEARCH	OHIO STATE UNIV. RES FDN
804612-020	OH	RESEARCH	OHIO STATE UNIV.
804613-020	OK	RESEARCH	OKLAHOMA STATE UNIV.
804615-020	OH	RESEARCH	OHIO RIVER VALLEY WATER SAN. COMM.
804620-020	CA	RESEARCH	CHINO BASIN MUN. WATER DIST.
804621-011	TX	RESEARCH	TEXAS, UNIV. OF
804621-020	TX	RESEARCH	TEXAS, UNIV. OF
804622-020	OR	RESEARCH	OREGON STATE UNIV.
804623-011	FL	RESEARCH	MIAMI, UNIV. OF
804628-010	MA	RESEARCH	LOWELL, UNIV. OF
804631-020	OH	RESEARCH	OHIO AGRI. RES. & DEVELOPMENT CENTER
804633-020	FL	RESEARCH	FLORIDA UNIV. OF
804635-020	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804639-020	DC	RESEARCH	AMERICAN PETROLEUM INST.
804640-020	TX	RESEARCH	NORTH TEXAS STATE UNIV.
804642-014	CA	RESEARCH	STANFORD RESEARCH INST.
804650-020	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
804652-011	MI	RESEARCH	MICHIGAN, UNIV. OF
804661-011	CO	RESEARCH	COLORADO SCHOOL OF MINES
804673-020	CO	RESEARCH	COLORADO STATE UNIV.
804679-020	AZ	RESEARCH	ARIZONA, UNIV. OF
804681-020	CA	RESEARCH	CALIFORNIA, UNIV. OF
804683-020	PA	RESEARCH	ACADEMY OF NATURAL SCIENCES
804684-013	IL	RESEARCH	ILLINOIS, UNIV. OF
804684-012	IL	RESEARCH	ILLINOIS, UNIV. OF
804686-020	MI	RESEARCH	MICHIGAN, UNIV. OF
804688-020	SC	RESEARCH	CHARLESTON, COLLEGE OF
804689-013	NY	RESEARCH	HEALTH RES INC/NY STATE DEPT OF HEALTH
804689-020	NY	RESEARCH	NEW YORK STATE DEPT. OF HEALTH
804692-012	CA	RESEARCH	CALIFORNIA STATE DEPT. OF HEALTH
804692-011	CA	RESEARCH	CALIFORNIA STATE DEPT. OF HEALTH
804700-020	MA	RESEARCH	HARVARD COLLEGE
804708-010	MI	DEMONSTRATION	EAST GRAND RAPIDS, CITY OF
804709-020	CA	RESEARCH	SOUTHERN CALIFORNIA METRO. WATER DIST.
804716-012	SC	RESEARCH	SOUTH CAROLINA, UNIV. OF
804717-020	SC	RESEARCH	CLEMSON UNIV.
804719-011	CO	RESEARCH	COLORADO STATE UNIV.
804728-011	WA	DEMONSTRATION	MEDICAL LAKE, TOWN OF
804731-011	IL	RESEARCH	ATLANTIC RICHFIELD CO.
804733-010	OH	RESEARCH	CINCINNATI, UNIV. OF
804734-020	NY	RESEARCH	SYRACUSE UNIV.
804736-012	MN	RESEARCH	MINNESOTA, UNIV. OF
804745-010	ME	RESEARCH	MAINE STATE DEPT. OF MARINE RESOURCES

GRANT NUMBER	STATE	PROGRAM	APPLICANT
804749-011	FL	RESEARCH	MIAMI, UNIV. OF
804750-020	OR	RESEARCH	OREGON GRAD. CTR. FOR STUDY & RES.
804763-013	PA	RESEARCH	DREXEL UNIV.
804773-012	WI	RESEARCH	WISCONSIN, UNIV. OF
804776-020	NY	RESEARCH	ASSOCIATED UNIVERSITIES, INC.
804778-020	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
804780-020	FL	RESEARCH	MIAMI, UNIV. OF
804820-020	NY	RESEARCH	RENSSELAER POLY. INST.
804827-012	CO	RESEARCH	COLORADO STATE UNIV.
804847-020	OK	RESEARCH	OKLAHOMA STATE UNIV.
804848-012	IL	RESEARCH	ILLINOIS, UNIV. OF
804850-012	TX	DEMONSTRATION	GULF COAST WASTE DISPOSAL AUTH
804860-013	NC	RESEARCH	DUKE UNIVERSITY
804865-020	NJ	RESEARCH	RUTGERS UNIVERSITY
804868-020	GA	RESEARCH	GEORGIA, UNIV. OF
804882-012	NH	RESEARCH	NEW HAMPSHIRE, UNIV. OF
804886-021	RI	RESEARCH	RHODE ISLAND, UNIV. OF
804888-020	SC	RESEARCH	GREENWOOD COMM. OF PUBLIC WORKS
804889-010	WI	RESEARCH	KENOSHA, CITY OF
804891-010	MA	RESEARCH	MASSACHUSETTS INST. OF TECH.
804894-010	MD	DEMONSTRATION	BALTIMORE, CITY OF
804896-010	OK	DEMONSTRATION	OKLAHOMA CONSERVATION COMM.
804898-020	OR	RESEARCH	OREGON, UNIV. OF
804903-020	MO	RESEARCH	MISSOURI, UNIV. OF
804906-010	NY	DEMONSTRATION	NEW YORK STATE DEPT ENVRN. CONSERV.
804908-010	NY	DEMONSTRATION	NEW YORK STATE DEPT ENVRN CONSERV
804910-010	CA	DEMONSTRATION	NORTH MARIN CNTY. WATER DIST.
804917-020	NC	RESEARCH	NORTH CAROLINA, UNIV OF
804918-012	WI	RESEARCH	WISCONSIN, UNIV. OF
804918-011	WI	RESEARCH	WISCONSIN, UNIV. OF
804921-020	CO	RESEARCH	COLORADO STATE UNIV.
804922-012	PA	RESEARCH	FRANKLIN INST.
804932-020	CT	RESEARCH	SIAM INST. FOR MATHEMATICS & SOC.
804940-020	LA	RESEARCH	LOUISIANA STATE UNIV. & A&M COLLEGE
804943-020	NJ	DEMONSTRATION	E. I. DUPONT DE NEMOURS & CO. INC.
804947-011	VA	RESEARCH	VIRGINIA INST. OF MARINE SCIENCE
804948-010	NY	RESEARCH	NEW YORK STATE UNIV/RACHEL CARSON COLL
804949-011	VA	DEMONSTRATION	RIVANNA WATER & SEWER & AUTH
804953-020	MN	RESEARCH	MINNESOTA, UNIV. OF
804955-020	AL	RESEARCH	SOUTHERN RES. INST.
804974-010	LA	RESEARCH	SOUTHERN UNIV.
804975-010	OK	RESEARCH	OKLAHOMA, UNIV. OF
804976-020	LA	RESEARCH	LOUISIANA STATE UNIV.
804977-011	FC	RESEARCH	B. C. RESEARCH
804978-020	MA	RESEARCH	MASSACHUSETTS INST. OF TECH.
804979-011	NC	RESEARCH	RESEARCH TRIANGLE INST.
804979-020	NC	RESEARCH	RESEARCH TRIANGLE INST.
804990-013	CA	RESEARCH	CALIFORNIA INST. OF TECH.
804993-011	VA	RESEARCH	VIRGINIA INST. OF MARINE SCIENCE
804996-020	MN	RESEARCH	MINNESOTA, UNIV. OF
804998-012	VA	RESEARCH	WILLIAM & MARY COLLEGE
805002-011	SC	RESEARCH	CLEMSON UNIVERSITY

GRANT NUMBER	STATE	PROGRAM	APPLICANT
805007-012	TX	RESEARCH	TEXAS, UNIV. OF
805008-010	OH	RESEARCH	OHIO STATE UNIV.
805014-020	VA	RESEARCH	VIRGINIA UNIV. MEDICAL COLLEGE
805027-010	PA	RESEARCH	CARNEGIE MELLON INST. OF RES.
805028-010	MA	DEMONSTRATION	BILLERICA, TOWN OF
805036-010	MA	RESEARCH	META SYSTEMS INC.
805043-012	MO	RESEARCH	WASHINGTON UNIVERSITY
805046-010	MI	RESEARCH	MICHIGAN STATE UNIV.
805047-012	NY	RESEARCH	RENSSELAER POLYTECHNIC INST.
805050-010	OH	RESEARCH	BATTELLE MEMORIAL INST.
805095-010	OH	RESEARCH	BATTELLE COLUMBUS LAB.
805096-010	NY	RESEARCH	ONONDAGA CNTY.
805097-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805100-010	FC	RESEARCH	DORSCH CONSULT LIMITED
805101-010	SC	RESEARCH	SOUTH CAROLINA, UNIV. OF
805107-010	LA	RESEARCH	TULANE UNIV.
805109-010	FC	RESEARCH	CHARLES HOWARD & ASSOC., LTD.
805110-010	LA	RESEARCH	TULANE UNIV.
805112-011	VA	RESEARCH	VIRGINIA, COMMONWEALTH OF
805114-010	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
805116-010	SC	RESEARCH	SOUTH CAROLINA, UNIV. OF
805117-010	OH	RESEARCH	DAYTON, UNIV. OF
805117-011	OH	RESEARCH	DAYTON, UNIV. OF
805129-010	RI	RESEARCH	RHODE ISLAND, UNIV. OF
805129-011	RI	RESEARCH	RHODE ISLAND, UNIV. OF
805132-010	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
805134-010	IL	RESEARCH	ILLINOIS INST. OF TECH.
805141-011	IL	RESEARCH	IIT RESEARCH INST.
805142-010	WA	RESEARCH	WASHINGTON STATE UNIV.
805143-010	KY	RESEARCH	KENTUCKY, UNIV. OF
805147-010	TX	RESEARCH	TEXAS, UNIV. OF
805149-010	SD	RESEARCH	SOUTH DAKOTA SCHOOL OF MINES & TECH
805150-010	FC	RESEARCH	TORONTO, UNIV. OF
805169-010	MA	RESEARCH	MASSACHUSETTS, UNIV. OF
805170-012	RI	RESEARCH	RAYTHEON COMPANY
805172-010	MN	RESEARCH	MINNESOTA, UNIV. OF
805174-010	FC	RESEARCH	HEBREW UNIV.
805175-010	MD	RESEARCH	MARYLAND EASTERN SHORE, UNIV. OF
805175-011	MD	RESEARCH	MARYLAND EASTERN SHORE, UNIV. OF
805176-010	MT	RESEARCH	MONTANA STATE UNIV.
805179-010	WA	DEMONSTRATION	PACIFIC WOOD TREATING CORP.
805181-010	MA	DEMONSTRATION	REED & BARTON SILVERSMITHS
805182-010	SC	DEMONSTRATION	LA FRANCE INDUSTRIES
805183-010	CO	RESEARCH	COLORADO STATE UNIV.
805184-010	NC	RESEARCH	NORTH CAROLINA, UNIV. OF
805185-010	WY	RESEARCH	WYOMING, UNIV. OF
805189-010	OH	DEMONSTRATION	FARM BUREAU DEVELOPMENT CORP.
805193-010	OH	RESEARCH	MIAMI UNIV.
805194-010	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
805195-010	CT	RESEARCH	CONNECTICUT, UNIV. OF
805198-010	MD	RESEARCH	JOHNS HOPKINS UNIV.
805207-010	FL	RESEARCH	CHARLOTTE HARBOR WATER ASSOC, INC.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
805208-010	CA	RESEARCH	SOUTHERN CALIFORNIA, UNIV. OF
805210-010	OR	RESEARCH	OREGON STATE UNIV.
805211-010	OH	RESEARCH	NATIONAL WATER WELL ASSOC.
805212-010	TX	RESEARCH	TEXAS SOUTHERN UNIV.
805215-010	CO	RESEARCH	COLORADO STATE UNIV.
805220-010	CA	RESEARCH	SOUTHERN CALIFORNIA EDISON CO.
805222-010	NY	RESEARCH	DUDLEY OBSERVATORY
805223-010	MI	RESEARCH	HAZARDOUS MATERIALS CONTROL RES. INST.
805226-010	ID	RESEARCH	MORGAN, RANDALL
805227-010	VA	RESEARCH	VIRGINIA, UNIV. OF
805228-010	AZ	RESEARCH	ARIZONA, UNIV. OF
805229-010	NY	RESEARCH	MANHATTAN COLLEGE
805230-010	MT	RESEARCH	MONTANA STATE UNIV.
805232-010	TX	RESEARCH	TEXAS A&M RES. FDN.
805237-010	SC	RESEARCH	BENEDICT COLLEGE
805238-010	MA	RESEARCH	META SYSTEMS INC
805239-010	NY	RESEARCH	NEW YORK UNIV.
805242-010	OK	RESEARCH	OKLAHOMA STATE UNIV.
805244-010	MA	RESEARCH	MASSACHUSETTS, UNIV. OF
805245-010	VT	DEMONSTRATION	CASTLETON, TOWN OF
805249-010	NE	RESEARCH	NEBRASKA, UNIV. OF
805254-010	NY	RESEARCH	HUNTER COLLEGE OF CUNY
805256-010	CA	DEMONSTRATION	MARYSVILLE, CITY OF
805257-010	IA	RESEARCH	IOWA, UNIV. OF
805270-010	MI	RESEARCH	MICHIGAN STATE UNIV.
805271-010	CO	RESEARCH	COLORADO STATE UNIV.
805272-010	TN	RESEARCH	TENNESSEE STATE DEPT. OF CONSERV.
805274-010	VA	RESEARCH	VIRGINIA POLYTECHNIC INST.
805278-010	OH	RESEARCH	OHIO STATE UNIV.
805279-010	CA	RESEARCH	MOULTON NIGUEL WATER DIST.
805281-010	WI	RESEARCH	WISCONSIN, UNIV. OF
805282-010	OR	RESEARCH	OREGON STATE UNIV.
805288-010	FL	RESEARCH	FLORIDA STATE UNIV.
805290-010	MN	RESEARCH	MINNESOTA, UNIV. OF
805291-010	MN	RESEARCH	MINNESOTA, UNIV. OF
805292-010	TX	RESEARCH	BAYLOR COLLEGE OF MEDICINE
805293-010	IL	RESEARCH	ILLINOIS, UNIV. OF
805294-010	MA	RESEARCH	HARVARD COLLEGE
805296-011	MS	RESEARCH	CLINTON, CITY OF
805296-010	MS	RESEARCH	CLINTON, CITY OF
805297-010	MO	RESEARCH	MISSOURI, UNIV. OF
805298-010	PA	RESEARCH	PITTSBURGH, UNIV. OF
805300-010	FL	RESEARCH	AMERCIAN ELECTROPLATERS' SOCIETY
805301-010	FL	RESEARCH	MIAMI, UNIV. OF
805304-010	PA	RESEARCH	PITTSBURGH, UNIV. OF
805307-010	OK	RESEARCH	OKLAHOMA STATE UNIV.
805311-010	MA	RESEARCH	MASSACHUSETTS INST. OF TECH.
805312-010	WV	RESEARCH	WEST VIRGINIA UNIV.
805313-010	WA	RESEARCH	WASHINGTON, UNIV. OF
805315-010	IL	RESEARCH	ILLINOIS UNIV. OF VETERINARY MEDICINE
805316-010	FL	RESEARCH	FLORIDA, UNIV. OF
805317-010	IL	RESEARCH	IIT RES. INST.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
805317-011	IL	RESEARCH	IIT RES. INST.
805318-010	AZ	RESEARCH	ARIZONA, UNIV. OF
805319-010	UT	RESEARCH	UTAH STATE UNIV.
805320-010	CO	RESEARCH	COLORADO STATE UNIV.
805321-011	MS	RESEARCH	JACKSON STATE UNIV.
805321-010	MS	RESEARCH	JACKSON STATE UNIV.
805324-010	CO	RESEARCH	DENVER, UNIV. OF
805325-010	IL	RESEARCH	DEPAUL UNIV.
805327-010	NY	RESEARCH	NEW YORK STATE DEPT OF ENVR CONSERV
805328-010	OH	RESEARCH	CASE WESTERN RESERVE UNIV.
805329-010	OH	RESEARCH	CENTRAL STATE UNIV.
805330-010	OH	RESEARCH	BATTELLE MEMORIAL INST.
805332-011	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
805332-010	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
805333-010	MI	RESEARCH	MICHIGAN, UNIV. OF
805335-010	OH	RESEARCH	BATTELLE MEMORIAL INST.
805336-010	PA	RESEARCH	BITUMINOUS COAL RES. INC.
805337-010	OH	RESEARCH	OHIO STATE UNIV. RES. FDN.
805338-010	MA	RESEARCH	MASSACHUSETTS INST. OF TECH.
805339-010	MI	RESEARCH	MICHIGAN, UNIV. OF
805341-010	LA	RESEARCH	TULANE UNIV.
805342-010	WA	RESEARCH	WASHINGTON STATE UNIV.
805343-010	WA	RESEARCH	WASHINGTON STATE UNIV.
805344-010	LA	RESEARCH	GULF SOUTH RES. INST.
805354-010	LA	RESEARCH	LOUISIANA STATE UNIV.
805355-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805356-010	IL	RESEARCH	NORTHWESTERN UNIV.
805357-010	TX	RESEARCH	TEXAS, UNIV. OF
805359-010	MD	RESEARCH	NATIONAL COUNCIL RADIATION
805363-010	WA	RESEARCH	WASHINGTON, UNIV. OF
805363-011	WA	RESEARCH	WASHINGTON, UNIV. OF
805364-010	NY	RESEARCH	ROCKEFELLER UNIV.
805365-010	CA	RESEARCH	OXNARD, CITY OF
805366-010	FL	RESEARCH	WEST FLORIDA, UNIV. OF
805367-010	MT	RESEARCH	MONTANA STATE UNIV.
805368-010	PA	RESEARCH	PITTSBURGH, UNIV. OF
805370-010	OH	RESEARCH	WOOSTER, COLLEGE OF
805371-010	NH	RESEARCH	MANCHESTER, CITY OF
805373-010	VA	RESEARCH	VIRGINIA POLYTECHNIC INST.
805376-010	WA	RESEARCH	WASHINGTON STATE UNIV.
805378-010	WA	RESEARCH	WASHINGTON, UNIV. OF
805379-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805379-011	CA	RESEARCH	CALIFORNIA, UNIV. OF
805383-010	MT	RESEARCH	MONTANA STATE UNIV.
805389-010	NY	RESEARCH	NEW YORK ZOOLOGICAL SOCIETY
805391-010	MT	RESEARCH	MONTANA STATE UNIV.
805394-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805399-010	ME	RESEARCH	MAINE, UNIV. OF
805400-010	FL	RESEARCH	FLORIDA, UNIV. OF
805401-010	CO	RESEARCH	COLORADO STATE UNIV.
805403-010	KS	RESEARCH	KANSAS STATE UNIV.
805404-010	NC	RESEARCH	NORTH CAROLINA, UNIV. OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
805406-010	MA	RESEARCH	LOWELL, UNIV. OF
805407-010	OR	RESEARCH	OREGON STATE UNIV.
805409-010	WA	RESEARCH	WASHINGTON, UNIV. OF
805410-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805410-011	CA	RESEARCH	CALIFORNIA, UNIV. OF
805411-010	MD	RESEARCH	MARYLAND, UNIV. OF
805411-013	MD	RESEARCH	MARYLAND, UNIV. OF
805411-012	MD	RESEARCH	MARYLAND, UNIV. OF
805413-010	WA	DEMONSTRATION	BOEING COMMERCIAL AIRPLANE CO.
805414-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805416-010	OR	RESEARCH	OREGON STATE UNIV.
805417-010	DC	RESEARCH	UNITED STATES DEPT. OF AGRICULTURE
805418-010	CA	RESEARCH	WOODWARD CLYDE CONSULTANTS
805419-010	OK	RESEARCH	OKLAHOMA STATE UNIV.
805420-010	MA	RESEARCH	WHEATON COLLEGE
805421-010	PA	RESEARCH	RESOURCE MANAGEMENT ASSOC.
805422-010	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
805423-010	OR	RESEARCH	OREGON STATE UNIV.
805424-010	FL	RESEARCH	FLORIDA, UNIV. OF
805426-010	CA	RESEARCH	STANFORD UNIV.
805427-010	AZ	RESEARCH	ARIZONA, UNIV. OF
805428-010	MN	RESEARCH	MINNESOTA STATE DEPT OF HEALTH
805429-010	MO	RESEARCH	MISSOURI, UNIV. OF
805430-010	WA	RESEARCH	WASHINGTON, UNIV. OF
805431-010	IL	RESEARCH	ILLINOIS, UNIV. OF
805436-010	OH	RESEARCH	HEIDELBERG COLLEGE
805438-011	CA	RESEARCH	CALIFORNIA STATE UNIV.
805438-010	CA	RESEARCH	CALIFORNIA STATE UNIV.
805441-010	TX	RESEARCH	TEXAS A&M RES. FDN.
805443-010	OH	RESEARCH	CINCINNATI, CITY OF
805446-010	MA	RESEARCH	HARVARD UNIV.
805447-010	CA	RESEARCH	CALIFORNIA STATE DEPT. OF HEALTH
805452-010	NY	RESEARCH	NEW YORK UNIV. STATE RES. FDN.
805453-010	AR	RESEARCH	ARKANSAS STATE GAME AND FISH COMM.
805454-010	ME	DEMONSTRATION	COBBOSSEE WATERSHED DIST.
805455-010	KS	RESEARCH	KANSAS, UNIV. OF
805456-010	AL	RESEARCH	ALABAMA A&M UNIV.
805457-010	CO	RESEARCH	COLORADO STATE UNIV.
805459-011	ND	RESEARCH	NORTH DAKOTA, UNIV. OF
805459-010	ND	RESEARCH	NORTH DAKOTA, UNIV. OF
805460-010	NC	RESEARCH	DUKE UNIV.
805462-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805463-010	RI	RESEARCH	RHODE ISLAND, UNIV. OF
805466-010	IN	RESEARCH	INDIANA AERONAUTICS COMM.
805467-010	NM	RESEARCH	AMERICANS FOR INDIAN OPPORTUNITY
805469-010	SC	RESEARCH	CHARLESTON, COLLEGE OF
805471-010	GA	RESEARCH	WILLIAM SCHOFIELD
805473-010	IL	RESEARCH	NORTHWESTERN UNIV.
805474-010	TX	RESEARCH	TEXAS A&M RES. FDN.
805476-010	IL	RESEARCH	ILLINOIS, UNIV. OF
805477-010	RI	RESEARCH	RHODE ISLAND, UNIV. OF
805478-010	MD	RESEARCH	MARYLAND, UNIV. OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
805482-010	NY	RESEARCH	COLUMBIA UNIV.
805484-010	NY	RESEARCH	NATIONAL AUDUBON SOCIETY
805488-010	RI	RESEARCH	RHODE ISLAND, UNIV. OF
805489-010	DE	RESEARCH	DELAWARD, UNIV. OF
805491-010	GA	RESEARCH	ATLANTA 2000 INC.
805493-010	MA	RESEARCH	NEW ENGLAND FISHERIES STEERING COMM.
805494-010	NC	RESEARCH	DUKE UNIV.
805499-010	OR	RESEARCH	OREGON STATE UNIV.
805500-010	PA	RESEARCH	PENNSYLVANIA STATE UNIV.
805501-010	NJ	RESEARCH	NEW JERSEY DEPT. OF ENVRN. PROTECTION
805502-010	WI	RESEARCH	INSTITUTE OF PAPER CHEMISTRY
805510-010	OR	RESEARCH	OREGON STATE UNIV.
805526-010	NJ	RESEARCH	NEW JERSEY DEPT. OF ENVRN. PROTECTION
805527-010	WA	RESEARCH	WASHINGTON STATE UNIV.
805528-010	IN	RESEARCH	MUNCIE SAN. DIST.
805529-010	FL	RESEARCH	FLORIDA, UNIV. OF
805538-010	MI	RESEARCH	NATIONAL SANITATION FDN.
805531-010	WI	RESEARCH	WISCONSIN, UNIV. OF
805532-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805533-010	TX	RESEARCH	SOUTHWEST RES. INST.
805534-010	AR	RESEARCH	ARKANSAS, UNIV. OF
805537-010	CA	RESEARCH	CALIFORNIA INST. OF TECH.
805540-010	MA	RESEARCH	MASSACHUSETTS GEN. HOSPITAL
805544-010	TX	RESEARCH	SOUTHWEST RES. INST.
805547-010	IL	RESEARCH	AMERICAN SOCIETY OF ANIMAL SCI.
805550-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805551-010	CA	RESEARCH	CONTRA COSTA CNTY. HEALTH DEPT.
805552-010	MA	RESEARCH	MASSACHUSETTS INST. OF TECH.
805554-010	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
805556-010	CA	RESEARCH	CALIFORNIA, UNIV. OF
805557-010	MA	RESEARCH	MASSACHUSETTS, UNIV. OF
805558-010	MA	RESEARCH	HARVARD UNIV.
805559-010	LA	RESEARCH	LOUISIANA TECH UNIV.
805560-010	FL	RESEARCH	FLORIDA, UNIV. OF
805561-010	OH	RESEARCH	BATTELLE MEMORIAL INST.
805564-010	OK	RESEARCH	OKLAHOMA STATE UNIV.
805569-010	KY	RESEARCH	LOUISVILLE FDN.,INC.,UNIV. OF
805572-010	NY	RESEARCH	NEW YORK STATE UNIV.
805577-010	CA	RESEARCH	CALIFORNIA DEPT. OF HEALTH
805579-010	MO	RESEARCH	MISSOURI, UNIV. OF
805581-010	CA	RESEARCH	OCCIDENTAL COLLEGE
805584-010	WA	RESEARCH	SEATTLE, MUN. OF METRO.
805585-010	WV	RESEARCH	WEST VIRGINIA UNIV.
805587-010	IL	RESEARCH	ILLINOIS, UNIV. OF
805588-010	IL	RESEARCH	ILLINOIS, UNIV. OF
805589-010	OH	RESEARCH	OHIO STATE UNIV.
805590-010	KY	RESEARCH	KENTUCKY, UNIV. OF
805593-010	CA	RESEARCH	CALIFORNIA DEPT. OF HEALTH
805595-010	NC	RESEARCH	NORTH CAROLINA STATE UNIV.
805598-010	PA	RESEARCH	PENNSYLVANIA DEPT. OF ENVRN. RESOURCES
805599-010	PA	RESEARCH	PITTSBURG, UNIV. OF
805602-010	WA	RESEARCH	SEATTLE, MUN. OF METRO.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
805603-010	IN	RESEARCH	PURDUE RES. FDN.
805606-010	TN	RESEARCH	TENNESSEE, UNIV. OF
805608-010	PA	RESEARCH	PITTSBURGH, UNIV. OF
805609-010	IN	RESEARCH	INDIANA UNIV.
805613-010	MD	RESEARCH	MARYLAND STATE ENVRN. SERVICE
805614-010	IL	RESEARCH	ILLINOIS, UNIV. OF
805615-010	IL	RESEARCH	ILLINOIS, UNIV. OF
805620-010	VA	RESEARCH	MITRE CORP.
805621-010	IL	RESEARCH	CHICAGO, CITY OF
805622-010	NC	RESEARCH	DUKE UNIV.
805623-010	VA	RESEARCH	MITRE CORP.
805624-010	MI	RESEARCH	MICHIGAN STATE UNIV.
805625-010	OR	RESEARCH	OREGON STATE UNIV.
805627-010	DC	RESEARCH	HOWARD UNIV.
805629-010	IL	RESEARCH	CHICAGO METRO. SAN. DIST.
805631-010	IN	RESEARCH	PURDUE UNIV.
805632-010	KY	DEMONSTRATION	KENTUCKY STATE DEPT NATURAL RESOURCES
805636-010	MT	RESEARCH	MONTANA STATE UNIV.
805638-010	MA	RESEARCH	MASSACHUSETTS, UNIV OF
805644-010	OH	RESEARCH	CINCINNATI, UNIV. OF
805647-010	MA	RESEARCH	HARVARD COLLEGE
805656-010	LA	RESEARCH	GULF SOUTH RES. INST.
805660-010	AK	RESEARCH	EMMONAK, CITY OF
805661-010	AK	RESEARCH	WAINWRIGHT, CITY OF
805666-010	NJ	RESEARCH	NEW JERSEY INST. OF TECH.
805668-010	AK	RESEARCH	ALASKA, UNIV. OF
805671-010	CO	RESEARCH	DENVER, UNIV. OF
805690-010	ID	RESEARCH	IDAHO, UNIV. OF
805691-010	NC	DEMONSTRATION	LAKE LURE, TOWN OF
805700-010	OH	RESEARCH	BATTELLE MEMORIAL INST.
900014-094	WI	TRAINING	MARQUETTE UNIV.
900065-057	IN	TRAINING	NOTRE DAME, UNIV. OF
900069-065	UT	TRAINING	UTAH STATE UNIV.
900072-083	OR	TRAINING	OREGON STATE UNIV.
900078-066	OK	TRAINING	OKLAHOMA STATE UNIV.
900107-084	TX	TRAINING	TEXAS, UNIV. OF
900115-047	TX	TRAINING	NORTH TEXAS STATE UNIV.
900121-048	MO	TRAINING	MISSOURI, UNIV. OF
900122-084	NC	TRAINING	NORTH CAROLINA, UNIV. OF
900123-064	OH	TRAINING	CINCINNATI, UNIV. OF
900127-083	NY	TRAINING	CORNELL UNIV.
900128-053	OR	TRAINING	LINN-BENTON COLLEGE
900129-043	TX	TRAINING	TEXAS A&M UNIV.
900131-064	CA	TRAINING	CALIFORNIA, UNIV. OF
900132-083	OH	TRAINING	TOLEDO, UNIV. OF
900133-085	CA	TRAINING	STANFORD UNIV.
900135-078	NY	TRAINING	MANHATTAN COLLEGE
900136-067	KS	TRAINING	KANSAS, UNIV. OF
900146-078	SC	TRAINING	CLEMSON UNIV.
900152-083	MA	TRAINING	TUFTS UNIV.
900166-053	WI	TRAINING	WISCONSIN, UNIV. OF
900175-076	TX	TRAINING	WILLIAM MARSH RICE UNIV.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
900180-043	MA	TRAINING	NORTHEASTERN UNIV.
900186-053	AZ	TRAINING	ARIZONA, UNIV. OF
900190-058	CA	TRAINING	CALIFORNIA, UNIV. OF
900198-074	NM	TRAINING	NEW MEXICO STATE UNIV.
900266-055	CO	TRAINING	COLORADO STATE UNIV.
900312-053	IL	TRAINING	ILLINOIS, UNIV. OF
900313-054	WA	TRAINING	WASHINGTON, UNIV. OF
900314-055	MS	TRAINING	MISSISSIPPI STATE UNIV.
900333-083	VA	TRAINING	VIRGINIA POLY. INST. & STATE UNIV.
900416-012	NY	TRAINING	SCIENTISTS' INST. FOR PUBLIC INFOR.
900500-024	NY	TRAINING	CORNELL UNIV.
900505-031	GA	TRAINING	ATLANTA UNIV. CTR.
900540-015	NY	TRAINING	NEW YORK STATE DEPT ENVRN. CONSERV.
900542-030	FL	TRAINING	FLORIDA, UNIV. OF
900557-013	CA	TRAINING	SOUTHERN CALIFORNIA, UNIV. OF
900577-012	NJ	TRAINING	NEW JERSEY ENVRN. COMM. ASSOC.
900580-012	CT	TRAINING	CONNECTICUT PUBLIC TV
900591-020	IA	TRAINING	NATIONAL FIELD RES. CTR., INC.
900591-021	IA	TRAINING	NATIONAL FIELD RES. CENTER, INC.
900593-012	CA	TRAINING	SOUTHERN CALIFORNIA, UNIV. OF
900593-020	CA	TRAINING	SOUTHERN CALIFORNIA, UNIV. OF
900607-011	DC	TRAINING	NATIONAL LEAGUE OF CITIES/CONFR MAYORS
900607-012	DC	TRAINING	NATIONAL LEAGUE OF CITIES
900633-012	DC	TRAINING	NATIONAL WILDLIFE FEDERATION
900647-011	OK	TRAINING	NATIONAL RURAL WATER ASSOC.
900654-010	NY	TRAINING	CONFERENCE OF STATE SAN. ENGRS.
900655-010	MA	TRAINING	NEW ENGLAND CONSORTIUM ENVRN. PROTECT
900656-010	PA	TRAINING	AMERICAN LAW INST.
900657-011	DC	TRAINING	NATIONAL ASSOC OF COUNTIES RES FDN
900658-010	CO	TRAINING	NATIONAL CONFERENCE STATE LEGISLATORS
900664-015	CA	TRAINING	HUMBOLT STATE UNIV.
900668-012	MD	TRAINING	MARYLAND, UNIV. OF
900676-010	MN	TRAINING	MINNESOTA, UNIV. OF
900677-010	PA	TRAINING	PITTSBURGH, UNIV. OF
900678-010	PA	TRAINING	PENNSYLVANIA STATE UNIV.
900679-010	CA	TRAINING	CALIFORNIA POLYTECHNIC STATE UNIV.
900680-010	TX	TRAINING	TEXAS, UNIV. OF
900681-010	MA	TRAINING	HARVARD UNIV.
900682-010	IL	TRAINING	AMERICAN PUBLIC WORKS ASSOC.
900683-010	OR	TRAINING	OREGON STATE UNIV.
900684-010	OH	TRAINING	CINCINNATI, UNIV. OF
900685-010	DC	TRAINING	LEAGUE OF WOMEN VOTERS
900686-010	DC	TRAINING	NATIONAL GOVERNORS CONFERENCE
900687-010	IL	TRAINING	ILLINOIS, UNIV. OF
900688-010	NJ	TRAINING	RUTGERS UNIV./COOK COLLEGE
900689-010	DC	TRAINING	CONSERVATION FDN.
900689-011	DC	TRAINING	CONSERVATION FDN.
900690-010	CA	TRAINING	CALIFORNIA STATE UNIV.
900690-011	CA	TRAINING	CALIFORNIA STATE UNIV.
900691-010	NY	TRAINING	NATIONAL URBAN LEAGUE, INC.
900691-012	NY	TRAINING	NATIONAL URBAN LEAGUE, INC.
900692-010	LA	TRAINING	LOUISIANA TECH. TRANSFER

GRANT NUMBER	STATE	PROGRAM	APPLICANT
900696-010	PA	TRAINING	PENNSYLVANIA ENVIRONMENTAL COUNCIL
900697-010	MO	TRAINING	ST. LOUIS REGIONAL COMMERCE
900699-010	OH	TRAINING	CINCINNATI, UNIV. OF
900700-010	IL	TRAINING	SOUTHERN ILLINOIS UNIV.
900701-010	MO	TRAINING	WATER & WASTEWATER TECH. SCH.
900702-010	MO	TRAINING	WATER WASTEWATER TECH. SCH.
900703-010	MA	TRAINING	ACTION FOR BOSTON COMM. DEV., INC.
900704-010	PA	TRAINING	PENNSYLVANIA STATE UNIV.
900705-010	DC	TRAINING	CONSERVATION FDN
900706-010	CA	TRAINING	SOUTHERN CALIFORNIA, UNIV. OF
900707-010	DC	TRAINING	METRO SEWERAGE AGENCIES, ASSOC OF
900708-010	CO	TRAINING	DENVER COMMUN. COLLEGE
900709-010	VT	TRAINING	VERMONT STATE DEPT. OF HEALTH
900710-010	OH	TRAINING	OHIO STATE UNIV.
900711-010	IA	TRAINING	ABC, INC.
900712-010	NY	TRAINING	NEW YORK STATE DEPT ENVRN CONSERV
900713-010	WA	TRAINING	GREEN RIVER COMMUN. COLLEGE
900714-010	SC	TRAINING	CLEMSON UNIV.
900715-010	DC	TRAINING	LEAGUE OF WOMEN VOTERS EDUCATION FUND
900716-010	TX	TRAINING	TEXAS A&M UNIV.
900717-010	NH	TRAINING	NEW HAMPSHIRE WATER SUPPLY & PC COMM.
900718-010	CO	TRAINING	COLORADO STATE UNIV.
900719-010	MI	TRAINING	MICHIGAN STATE DEPT OF PUBLIC HEALTH
900720-010	UT	TRAINING	UTAH STATE DIVISION OF HEALTH
900721-010	DC	TRAINING	ENVRN. ACTION FDN.
900722-010	MT	TRAINING	MONTANA STATE DEPT HEALTH & ENVRN. SCI
900723-010	NJ	TRAINING	NEW JERSEY STATE DEPT ENVRN PROTECTION
900724-010	NY	TRAINING	NEW YORK STATE HEALTH DEPT
900725-010	SC	TRAINING	SOUTH CAROLINA DEPT ENVRN CONTROL
900726-010	PA	TRAINING	PENNSYLVANIA STATE DEPT ENVRN RESOURCE
900730-010	IL	TRAINING	ILLINOIS STATE EPA
900731-010	GA	TRAINING	GEORGIA STATE DEPT NATURAL RESOURCES
900732-010	TX	TRAINING	TEXAS ENVRN. COALITION
900733-010	CO	TRAINING	AMERICAN WATER WKS. ASSOC.
900734-010	VT	TRAINING	VERMONT STATE DEPT. OF HEALTH
900735-010	MD	TRAINING	MARYLAND STATE DEPT. OF HEALTH
900736-010	NE	TRAINING	NEBRASKA STATE DEPT. OF HEALTH
900737-010	GA	TRAINING	SAVANNAH STATE COLLEGE
900738-010	VA	TRAINING	VIRGINIA STATE DEPT OF HEALTH
900740-010	MD	TRAINING	CHARLES CNTY. COMMUN. COLLEGE
900741-010	OH	TRAINING	CINCINNATI, UNIV. OF
900742-010	PA	TRAINING	PENNSYLVANIA STATE DEPT COMMUN AFFAIRS
900743-010	TX	TRAINING	TEXAS DEPT. OF HEALTH RESOURCES
900744-010	DC	TRAINING	NATIONAL ASSOC. OF CONSERVATION DIST.
900745-010	MS	TRAINING	MISSISSIPPI STATE BD OF HEALTH
900746-010	CT	TRAINING	CONNECTICUT STATE HEALTH DEPT
900747-010	IA	TRAINING	KIRKWOOD COMMUN. COLLEGE
900748-010	VA	TRAINING	CITIZENS PROGRAM FOR CHESAPEAKE BAY
900750-010	WI	TRAINING	WISCONSIN STATE DEPT NATURAL RESOURCES
900751-010	MI	TRAINING	MICHIGAN STATE UNIV.
900752-010	OK	TRAINING	OKLAHOMA STATE DEPT. OF HEALTH
900753-010	NY	TRAINING	NEW YORK STATE DEPT. ENVRN. CONSERV

GRANT NUMBER	STATE	PROGRAM	APPLICANT
900755-010	VA	TRAINING	VIRGINIA STATE AIR POLLUTION CONTR. BD
900756-010	CO	TRAINING	DENVER COMMUN. COLLEGE
900757-010	DC	TRAINING	NATIONAL ASSOC. OF COUNTIES
900758-010	ID	TRAINING	IDAHO STATE UNIV.
900761-010	VA	TRAINING	URBAN ENVRN. STUDIES CENTER
900762-010	DC	TRAINING	GEORGETOWN UNIV.
900763-010	DC	TRAINING	NATIONAL ASSOC. OF REGIONAL COUNCILS
900767-010	SC	TRAINING	SOUTHERN EDUC. COMMUNICATIONS ASSOC.
900769-010	NY	TRAINING	NEW YORK STATE DEPT OF HEALTH
910381-013	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910429-014	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910520-013	RI	FELLOWSHIPS	RHODE ISLAND, UNIV. OF
910581-012	MO	FELLOWSHIPS	WASHINGTON UNIV.
910631-013	UT	FELLOWSHIPS	UTAH STATE UNIV.
910659-012	CO	FELLOWSHIPS	COLORADO, UNIV. OF
910706-012	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910707-013	WV	FELLOWSHIPS	WEST VIRGINIA COLLEGE GRADUATE STUDIES
910709-012	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910710-012	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910711-012	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910712-014	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910712-012	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910714-012	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910715-012	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910717-012	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910718-011	MO	FELLOWSHIPS	WASHINGTON UNIV.
910724-011	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
910733-012	WV	FELLOWSHIPS	WEST VIRGINIA COLLEGE GRAD. STUDIES
910738-012	NY	FELLOWSHIPS	COOPER UNION
910740-012	NY	FELLOWSHIPS	COOPER UNION
910743-012	NY	FELLOWSHIPS	COOPER UNION
910744-012	NY	FELLOWSHIPS	COOPER UNION
910745-012	NY	FELLOWSHIPS	COOPER UNION
910748-012	NY	FELLOWSHIPS	COOPER UNION
910750-012	NY	FELLOWSHIPS	COOPER UNION
910751-011	NY	FELLOWSHIPS	COOPER UNION
910752-013	NY	FELLOWSHIPS	COOPER UNION
910753-012	NY	FELLOWSHIPS	COPPER UNION
910754-012	NY	FELLOWSHIPS	COOPER UNION
910755-012	NY	FELLOWSHIPS	COOPER UNION
910756-012	NY	FELLOWSHIPS	COOPER UNION
910758-012	NY	FELLOWSHIPS	COOPER UNION
910759-012	NY	FELLOWSHIPS	COOPER UNION
910761-012	NY	FELLOWSHIPS	COOPER UNION
910762-012	NY	FELLOWSHIPS	COOPER UNION
910764-012	NY	FELLOWSHIPS	COOPER UNION
910765-012	NY	FELLOWSHIPS	COOPER UNION
910767-012	NY	FELLOWSHIPS	COOPER UNION
910770-011	NY	FELLOWSHIPS	COOPER UNION
910771-011	NY	FELLOWSHIPS	COOPER UNION
910772-011	NY	FELLOWSHIPS	COOPER UNION
910773-011	PA	FELLOWSHIPS	DREXEL UNIV.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
910779-011	CA	FELLOWSHIPS	SANTA CLARA, UNIV. OF
910780-012	NY	FELLOWSHIPS	COOPER UNION
910781-011	CA	FELLOWSHIPS	SOUTHERN CALIFORNIA, UNIV. OF
910792-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910796-011	WI	FELLOWSHIPS	WISCONSIN, UNIV. OF
910797-011	OK	FELLOWSHIPS	OKLAHOMA, UNIV. OF
910801-011	AL	FELLOWSHIPS	ALABAMA, UNIV. OF
910811-011	UT	FELLOWSHIPS	UTAH, UNIV. OF
910813-011	NY	FELLOWSHIPS	RENSSELAER POLYTECHNIC INST.
910826-011	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
910827-012	NY	FELLOWSHIPS	RENSSELAER POLYTECHNIC INST.
910829-011	TX	FELLOWSHIPS	TEXAS, UNIV. OF
910830-012	NY	FELLOWSHIPS	NEW YORK POLYTECHNIC INST.
910830-011	NY	FELLOWSHIPS	NEW YORK POLYTECHNIC INST.
910838-011	CT	FELLOWSHIPS	NEW HAVEN, UNIV. OF
910850-011	CA	FELLOWSHIPS	CALIFORNIA, UNIV. OF
910854-011	CT	FELLOWSHIPS	NEW HAVEN, UNIV. OF
910864-011	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910865-011	UT	FELLOWSHIPS	UTAH STATE UNIV.
910868-011	UT	FELLOWSHIPS	UTAH STATE UNIV.
910870-012	DC	FELLOWSHIPS	GEORGE WASHINGTON UNIV.
910871-011	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910876-011	WI	FELLOWSHIPS	WISCONSIN, UNIV. OF
910879-011	MA	FELLOWSHIPS	TUFTS UNIV.
910884-011	CA	FELLOWSHIPS	HEALD ENGR. COLLEGE
910896-011	WI	FELLOWSHIPS	WISCONSIN, UNIV. OF
910903-011	CA	FELLOWSHIPS	CALIFORNIA STATE UNIV.
910907-011	UT	FELLOWSHIPS	UTAH STATE UNIV.
910917-011	MD	FELLOWSHIPS	JOHNS HOPKINS UNIV.
910922-011	UT	FELLOWSHIPS	UTAH, UNIV. OF
910923-011	RI	FELLOWSHIPS	RHODE ISLAND, UNIV. OF
910931-011	CA	FELLOWSHIPS	CALIFORNIA STATE COLLEGE
910938-011	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
910949-011	TX	FELLOWSHIPS	HOUSTON, UNIV. OF
910964-011	MD	FELLOWSHIPS	MARYLAND, UNIV. OF
910965-011	MD	FELLOWSHIPS	MARYLAND, UNIV. OF
910966-012	MD	FELLOWSHIPS	MARYLAND, UNIV. OF
910968-011	MD	FELLOWSHIPS	JOHNS HOPKINS UNIV.
910983-010	NY	FELLOWSHIPS	RENSSELAER POLYTECHNIC INST.
910985-010	MS	FELLOWSHIPS	MISSISSIPPI, UNIV. OF
910986-010	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
910987-010	AL	FELLOWSHIPS	ALABAMA, UNIV. OF
910991-010	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
910993-010	MA	FELLOWSHIPS	MASSACHUSETTS INST. OF TECH.
910994-010	IN	FELLOWSHIPS	INDIANA, UNIV. OF
910995-010	VA	FELLOWSHIPS	VIRGINIA, UNIV. OF
910996-010	CA	FELLOWSHIPS	SOUTHERN CALIFORNIA, UNIV. OF
910998-010	MI	FELLOWSHIPS	MICHIGAN, UNIV. OF
911000-010	MA	FELLOWSHIPS	HARVARD UNIV.
911001-010	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
911002-010	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
911004-010	FL	FELLOWSHIPS	FLORIDA, UNIV. OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
911005-010	TX	FELLOWSHIPS	HOUSTON, UNIV. OF
911007-010	MO	FELLOWSHIPS	MISSOURI, UNIV. OF
911009-010	KS	FELLOWSHIPS	KANSAS, UNIV. OF
911010-010	NY	FELLOWSHIPS	RENSSELAER POLYTECHNIC INST.
911011-010	FL	FELLOWSHIPS	FLORIDA, UNIV. OF
911013-010	AZ	FELLOWSHIPS	ARIZONA STATE UNIV.
911015-010	CA	FELLOWSHIPS	SOUTHERN CALIFORNIA, UNIV. OF
911016-010	MA	FELLOWSHIPS	HARVARD UNIV.
911017-010	NJ	FELLOWSHIPS	RUTGERS UNIV.
911018-010	CA	FELLOWSHIPS	CALIFORNIA STATE UNIV.
911020-010	PA	FELLOWSHIPS	PENNSYLVANIA STATE UNIV.
911021-010	FL	FELLOWSHIPS	FLORDIA, UNIV. OF
911025-010	MA	FELLOWSHIPS	HARVARD UNIV.
911026-010	IN	FELLOWSHIPS	BALL STATE UNIV.
911028-010	KS	FELLOWSHIPS	KANSAS, UNIV. OF
911029-010	MD	FELLOWSHIPS	JOHN HOPKINS UNIV.
911033-010	CA	FELLOWSHIPS	GOLDEN GATE UNIV.
911035-010	FL	FELLOWSHIPS	FLORIDA, UNIV. OF
911036-010	CA	FELLOWSHIPS	CALIFORNIA STATE UNIV.
911037-010	PA	FELLOWSHIPS	DREXEL UNIV.
911040-010	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
911041-010	PA	FELLOWSHIPS	DREXEL UNIV.
911042-010	PA	FELLOWSHIPS	DREXEL UNIV.
911045-010	OH	FELLOWSHIPS	TOLEDO, UNIV. OF
911046-010	MA	FELLOWSHIPS	HARVARD UNIV.
911048-010	MA	FELLOWSHIPS	BRIDGEWATER STATE COLLEGE
911049-010	FL	FELLOWSHIPS	FLORIDA, UNIV. OF
911050-010	MA	FELLOWSHIPS	HARVARD UNIV.
911052-011	SC	FELLOWSHIPS	CLEMSON UNIV.
911052-010	SC	FELLOWSHIPS	CLEMSON UNIV.
911053-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
911054-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
911055-010	WA	FELLOWSHIPS	WASHINGTON STATE UNIV.
911056-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
911057-010	SC	FELLOWSHIPS	SOUTH CAPOLINA, UNIV. OF
911058-010	MA	FELLOWSHIPS	HARVARD UNIV.
911061-010	CA	FELLOWSHIPS	CALIFORNIA, UNIV. OF
911062-010	VA	FELLOWSHIPS	VIRGINIA COMMONWEALTH UNIV.
911064-010	TX	FELLOWSHIPS	LAMAR UNIV.
911065-010	TX	FELLOWSHIPS	HOUSTON, UNIV. OF
911068-010	CA	FELLOWSHIPS	CONTROL DATA INST.
911069-010	CA	FELLOWSHIPS	CALIFORNIA, UNIV. OF
911072-010	TX	FELLOWSHIPS	TEXAS, UNIV. OF
911074-010	PA	FELLOWSHIPS	PENNSYLVANIA, UNIV. OF
911075-010	VA	FELLOWSHIPS	VIRGINIA COMMONWEALTH UNIV.
911076-010	KY	FELLOWSHIPS	KENTUCKY, UNIV. OF
911078-010	NY	FELLOWSHIPS	RENSSELAER POLYTECHNIC INST.
911079-010	CO	FELLOWSHIPS	COLORADO STATE UNIV.
911081-010	OH	FELLOWSHIPS	CINCINNATI, UNIV. OF
911082-010	CA	FELLOWSHIPS	SANTA CLARA, UNIV. OF
911083-010	MA	FELLOWSHIPS	BOSTON COLLEGE
911084-010	CA	FELLOWSHIPS	SOUTHERN CALIFORNIA, UNIV. OF

GRANT NUMBER	STATE	PROGRAM	APPLICANT
911087-010	CA	FELLOWSHIPS	HEALD ENGINEERING COLLEGE
911089-010	NY	FELLOWSHIPS	NEW YORK POLYTECHNIC INST.
911091-010	OH	FELLOWSHIPS	AKRON, UNIV. OF
911092-010	CA	FELLOWSHIPS	SAN JOSE STATE UNIV.
911094-010	NJ	FELLOWSHIPS	NEW JERSEY INST. OF TECH.
911095-010	MA	FELLOWSHIPS	NORTHEASTERN UNIV.
911097-010	CA	FELLOWSHIPS	SANTA CLARA, UNIV. OF
911098-010	MA	FELLOWSHIPS	HARVARD UNIV.
911104-010	DC	FELLOWSHIPS	GEORGE WASHINGTON UNIV.
911107-010	NY	FELLOWSHIPS	NEW YORK UNIV.
911109-010	AL	FELLOWSHIPS	ALABAMA, UNIV. OF
911110-010	NY	FELLOWSHIPS	NEW YORK STATE UNIV.
911112-010	NY	FELLOWSHIPS	RENSSELAER POLYTECHNIC INST.
911113-010	NC	FELLOWSHIPS	NORTH CAROLINA, UNIV. OF
911114-010	DC	FELLOWSHIPS	GEORGE WASHINGTON UNIV.
911115-010	MD	FELLOWSHIPS	MARYLAND, UNIV. OF
911116-010	NC	FELLOWSHIPS	NORTH CAROLINA, UNIV. OF
911117-010	WA	FELLOWSHIPS	SEATTLE UNIV.
911118-010	MD	FELLOWSHIPS	MARYLAND, UNIV. OF
911119-010	SC	FELLOWSHIPS	CLEMSON UNIV.
911120-010	DC	FELLOWSHIPS	GEORGE WASHINGTON UNIV.
911121-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
911122-010	SC	FELLOWSHIPS	SOUTH CAROLINA, UNIV. OF
911124-010	DC	FELLOWSHIPS	AMERICAN UNIV.
911125-010	CT	FELLOWSHIPS	CONNECTICUT, UNIV. OF
911126-010	WI	FELLOWSHIPS	WISCONSIN, UNIV. OF
911127-010	OR	FELLOWSHIPS	OREGON STATE UNIV.
911128-010	MD	FELLOWSHIPS	MARYLAND, UNIV. OF
911129-010	CA	FELLOWSHIPS	CALIFORNIA, UNIV. OF
911130-010	FL	FELLOWSHIPS	FLORIDA, UNIV. OF
911131-010	NE	FELLOWSHIPS	NEBRASKA, UNIV. OF
911132-010	NY	FELLOWSHIPS	COLUMBIA UNIV.
911133-010	MO	FELLOWSHIPS	MISSOURI SOUTHERN STATE COLLEGE
911134-010	MD	FELLOWSHIPS	MARYLAND, UNIV. OF
911135-010	CA	FELLOWSHIPS	WESTERN STATE UNIV.
911136-010	CA	FELLOWSHIPS	CALIFORNIA STATE UNIV.
911137-011	CA	FELLOWSHIPS	LOYOLA MARYMOUNT UNIV.
911137-010	CA	FELLOWSHIPS	LOYOLA MARYMOUNT UNIV.
911138-010	CA	FELLOWSHIPS	SOUTHERN CALIFORNIA, UNIV. OF
911139-010	CA	FELLOWSHIPS	CALIFORNIA STATE UNIV.
911139-011	CA	FELLOWSHIPS	CALIFORNIA STATE UNIV.
911141-010	CA	FELLOWSHIPS	GOLDEN STATE UNIV.
911142-010	OK	FELLOWSHIPS	OKLAHOMA, UNIV. OF
911145-010	MN	FELLOWSHIPS	MINNESOTA, UNIV. OF
911146-010	DC	FELLOWSHIPS	AMERICAN UNIV.
911148-010	TX	FELLOWSHIPS	TEXAS, UNIV. OF
911149-010	TN	FELLOWSHIPS	MEMPHIS STATE UNIV.
911150-010	CA	FELLOWSHIPS	STANFORD UNIV.
911151-010	CA	FELLOWSHIPS	SAN BERNARDINO VALLEY COLL.
911152-010	FL	FELLOWSHIPS	FLORIDA STATE UNIV.
911153-010	MT	FELLOWSHIPS	MONTANA STATE UNIV.
911154-010	CA	FELLOWSHIPS	STANFORD UNIV.

GRANT NUMBER	STATE	PROGRAM	APPLICANT
911155-010	VA	FELLOWSHIPS	VIRGINIA POLYTECHNIC INST.&STATE UNIV.

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SELECT RESEARCH GROUP IN AIR POLLUTION METEOROLOGY

START/ COMPL DATE :    10/72 - 03/78 : FUNDING : EST. - FY   77  / $  220000
 TASK/EPA CODE :G603A-AB-02  / R800397     (GRANT)  PRIOR  FY76 / $  3830001
PROJECT OFFICER : L E  NIEMEYER
INVESTIGATORS :     D W THOMSON                    PENN. STATE UNIVERSITY
                    R A ANTHES                     PENN. STATE UNIVERSITY
                    A K BLACKADAR                  PENN. STATE UNIVERSITY
                    R L KABEL                      PENN. STATE UNIVERSITY
                    J   LUMLEY                     PENN. STATE UNIVERSITY
                    H   TENNEKES                   PENN. STATE UNIVERSITY
MILE: 03/78 -FINAL REPORT
  PREVIOUS WORK IN THE CONTINUING SRG PROGRAM WAS FOCUSED TOWARD DEVELOPMENT
   OF A COMPREHENSIVE, METEOROLOGICAL MODEL SUITABLE FOR APPLICATION
  TO URBAN, MESO AND SYNOPTIC SCALE PROBLEMS. THE RESULTING MODEL IS NO
  W UNDERGOING EXTENSIVE TESTING AND VALIDATION CASE STUDIES. SEVERAL OF THE
   1, 2 AND 3-D VERSIONS ARE ALSO BEING APPLIED TO SELECTED AIR POLLUTION
  TRANSPORT AND DIFFUSION SITUATIONS SUCH AS EAST COAST AIR
  STAGNATION EPISODES. RESEARCH ALSO CONTINUES INTO IMPROVED PLANETARY BOUND
  ARY LAYER (PBL) PARAMETERIZATION SCHEMES. SIMPLIFIED II-ND ORDER CLOSE SCH
  EMES HAVE BEEN VERIFIED AGAINST SODAR AND AIRCRAFT MEASUREMENTS USING OBSE
  RVATIONAL SYSTEMS DEVELOPED EARLIER IN THE PROGRAM. SEVERAL 1-D PBL MODELS
  HAVE BEEN INTEGRATED WITH COMMONLY USED DIFFUSION PREDICTION MODELS AND AD
  APTED FOR GENERAL USE ON DESK TOP CALCULATORS. TESTING OF SURFACE BOUNDARY
   CONDITION PARAMETERIZATION SCHEMES IS PROCEEDING USING SATELLITE
  OBSERVATIONS OF THE LOS ANGELES BASIN. SELECTED POLLUTANT DEPOSITION VE
  LOCITIES ARE BEING DERIVED ON THE BASIS OF AIRBORNE MEASUREMENTS MADE IN P
  ENNSYLVANIA AND NEW YORK. AIR BORNE MEASUREMENTS MADE DURING THE ST. LOUIS
   RAPS EXPERIMENT WILL BE PREPARED FOR USE IN URBAN SCALE MODELING STUDIES.
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OPTICAL EFFECTS OF ATMOSPHERIC AEROSOL

   START/ COMPL DATE :    07/77 - 06/78 : FUNDING : EST, - FY   77  / $  125000
    TASK/EPA CODE :G603A-AG-11  / R800665-13  (GRANT)  PRIOR  FY76 / $   360001
   PROJECT OFFICER : T    ELLESTAD
   INVESTIGATORS :    A P WAGGONER                        UNIV, OF WASHINGTON
                      R J CHARLSON                        UNIV, OF WASHINGTON
   MILE: 06/78 -REPORT ON ANTHROPOGENIC CONTRIBUTION TO VISIBILITY REDUCTION
     THIS CONTINUES OUR PAST STUDIES RELATING AEROSOL SOURCES, PHYSICAL AND
     CHEMICAL PROPERTIES OF THE PARTICLES, EFFECTS OF RELATIVE HUMIDITY TO
     ATMOSPHERIC OPTICAL PROPERTIES SUCH AS RADIATIVE CLIMATE AND VISIBILITY,
     INCLUDED WILL BE STUDIES OF THE RELATIONSHIPS OF PARTICLE PROPERTIES AND
     SYNOPTIC SCALE TRANSPORT,
OPTICAL EFFECTS OF ATMOSPHERIC AEROSOL

   START/ COMPL DATE :    10/75 - 12/78 : FUNDING : EST. - FY   77  / $   25000
    TASK/EPA CODE :G625B-EA-15  / R800665-13  (GRANT)  PRIOR  FY76 / $   350001
   PROJECT OFFICER : I I  WILSON
   INVESTIGATORS :    A P WAGGONER                       UNIV. OF WASHINGTON
                      R J CHARLSON                       UNIV. OF WASHINGTON
   MILE: 12/78 -FINAL REPORT
     THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTH
     ERS. THIS CONTINUE OUR PAST STUDIES RELATING AEROSOL SOURCES, PHYSICAL AND
     CHEMICAL PROPERTIES OF THE PARTICLES, EFFECTS OF RELATIVE HUMIDITY TO
     ATMOSPHERIC OPTICAL PROPERTIES SUCH AS RADIATIVE CLIMATE AND VISIBILITY.
      INCLUDED WILL BE STUDIES OF THE RELATIONSHIPS OF PARTICLE PROPERTIES
     AND SYNOPTIC SCALE TRANSPORT.
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OUTDOOR SIMULATION OF AIR POLLUTION CONTROL STRATEGIES

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START/ COMPL DATE :    02/75 - 01/78 : FUNDING : EST. - FY   77  / $  119000
 TASK/EPA CODE :G603A-AC-05  / R800916-05  (GRANT)  PRIOR  FY76 / $  1000001
PROJECT OFFICER : J J  BUFALINI
INVESTIGATORS :    H   JEFFRIES                    UNIV. OF NORTH CAROLINA
                   D L FOX                         UNIV. OF NORTH CAROLINA
MILE: 05/77 -REPORT - EFFECTS OF DILUTION
      10/78 -REPORT - TEMPERATURE EFFECTS ON PHOTOCHEMICAL SMOG
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IT HAS BEEN THE BELIEF OF OUR RESEARCH GROUP THAT AN UNDERSTANDING OF THE SMOG PRECURSORS AND ITS CONTROL CAN BE MOST EFFECTIVELY ACHIEVED BY THE INTEGRATED USE OF SMOG CHAMBER DATA, PHOTOCHEMICAL MODELING AND AEROMETRIC MEASUREMENTS. WE HAVE DISCOVERED THAT DIRECT AND SIMPLE APPLICATION OF CURRENT SMOG CHAMBER DATA TO REAL ATMOSPHERIC CONDITIONS IS DIFFICULT AT BEST. THIS IS BECAUSE 1.) OXIDANT YIELDS IN CHAMBERS ARE STRONGLY DEPENDENT ON WALL CHARACTERISTICS, NITROGEN-ALDEHYDES CHEMISTRY, CHAMBER LIGHT INTENSITIES AND EXPERIMENTAL TEMPERATURES AND 2.) THE DYNAMIC PROCESSES OF INJECTION, DILUTION AND MIXING IN REAL ATMOSPHERES ARE NOT WELL REPRESENTED BY JUST IRRADIATING MORNING URBAN CONCENTRATIONS IN A SMOG CHAMBER. IT IS OUR HOPE THAT CURRENT AND CONTINUED REFINEMENTS IN OUR PHOTOCHEMICAL MODEL WILL MAKE IT POSSIBLE TO BETTER QUANTIFY THE MOST IMPORTANT REGIONS OF HYDROCARBON NOX-OXIDANT CONTROL STRATEGY DIAGRAMS. SOME OF THE MAJOR IMPROVEMENTS IN THE MODEL WILL COME FROM THE RESULTS OF OUR PROPOSED SMOG EXPERIMENTS WHICH WILL ISOLATE THE INFLUENCE OF NITRIC AND NITROUS ACID, ALDEHYDE, PAN, CARBON MONOXIDE, AROMATICS AND LESS REACTIVE HYDROCARBON MATERIALS ON SMOG SYSTEMS. SINCE MOST OF THIS WORK WILL BE DONE ON STATIC SMOG CHAMBER SYSTEMS, CONTINUED EFFORT WILL BE MADE TO SIMULATE REAL ATMOSPHERIC SMOG CONDITIONS BY USING SOPHISTICATED PATTERNS OF CONTINUED INJECTION AND DILUTION IN THE CHAMBER. SIMULTANEOUSLY, STATIC ANALOG EXPERIMENTS WILL BE CONDUCTED WITH THESE VERY COMPLEX EXPERIMENTS. THIS INFORMATION WILL THEN BE USED TO RECONSTRUCT MODELING RESULTS SO THAT THE DERIVED CONTROL STRATEGY RELATIONSHIPS WILL HAVE IMPLICIT ATMOSPHERIC RELEVANCE.

II-24

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NITROSAMINE FORMATION

  START/ COMPL DATE :    01/76 - 12/79 : FUNDING : EST. - FY   77  / $   15000
   TASK/EPA CODE :G603A-AE-08  / R800916-05  (GRANT)  PRIOR  FY   /          1
  PROJECT OFFICER : -    BUFALINI
  INVESTIGATORS :   H   JEFFRIES                        UNIV. OF NORTH CAROLINA
  MILE: 12/79 -FINAL REPORT
    THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO
    OTHERS. DETERMINE THE KINETICS OF NITROSAMINE FORMATION AND DEGRADATION.
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800938

The aim of the investigation of urban street cleaning is threefold: (a) To identify and analyze activities affecting mechanized street cleaning; to develop mathematical and simulation models with which present practice can be evaluated; (b) To collect data in order to establish an extensive data base for a specific urban district; (c) To design and evaluate implementable policy changes that would increase the effectiveness of the operation. These objectives are realized in terms of six specific tasks: (1) Creation of a computer data bank for the experimental district (completed); (2) Development of a litter generation model (in progress); (3) Evaluation and modification of the routing of mechanical sweepers (planned); (4) Quantitative evaluation of the effect of illegally parked cars on street sweeping (completed); (5) Design of policies for the enforcement of parking regulations (in progress); (6) Analysis of the overall problem (planned).

MECHANISMS OF PESTICIDE DEGRADATION

START/ COMPL DATE : 05/73 - 05/78 : FUNDING : EST. - FY 77 / $ 51808
TASK/EPA CODE :H615F-7619 / R801060-13 (GRANT) PRIOR FY76 / $ 2399211
PROJECT OFFICER : R F MOSEMAN
INVESTIGATORS : F MATSUMURA UNIV. OF WISCONSIN
MILE: 01/77 -CHLORDIMEFORM EFFECTS ON ENZYME SYSTEMS
05/77 -METABOLISM OF TOXAPHENE IN RATS

THE MAJOR OBJECTIVE OF THIS PROJECT IS TO UNDERSTAND THE DEFENSE MECHANISMS OF ANIMALS TO PESTICIDAL CHEMICALS. THE COMPOUNDS WHICH ARE IMPORTANT FROM THE VIEWPOINT OF ENVIRONMENTAL CONTAMINATION ARE THE PRIMARY TARGET OF THIS RESEARCH PROJECT. EFFORTS WILL BE MADE TO STUDY THE BIOCHEMICAL MECHANISMS BY WHICH ORGANOPHOSPHATE, CARBAMATE AND OTHER INSECTICIDAL CHEMICALS AFFECT LIVING TISSUES. SPECIFIC PROJECTS PROPOSED ARE (1) TO STUDY THE GLUTATHIONE DEPENDENT DEALKYLATING AND DEARYLATING SYSTEMS IN VARIOUS ANIMALS FROM A COMPARATIVE BIOCHEMICAL STANDPOINT, (2) TO STUDY THE ROLE OF MIXED-FUNCTION OXIDASE SYSTEMS, (3) TO STUDY AND CLASSIFY VARIOUS ESTERASES DEGRADING ORGANOPHOSPHATE AND CARBAMATE ESTERS, AND (4) TO STUDY VARIOUS CONJUGATION ENZYMES IN ANIMALS. THE OVERALL AIM IS TO STUDY VARIOUS TARGET SYSTEMS AND DEFENSE MECHANISMS OF ANIMALS, BY BIOCHEMICALLY CHARACTERIZING EACH FACTOR THROUGH ISOLATION PURIFICATION, DIFFERENTIAL INHIBITION AND COMPARISON OF SUBSTRATE SPECTRA.

STRUCTURE AND REACTIVITY OF ADSORBED OXIDES OF SULFUR

START/ COMPL DATE : 12/73 - 12/78 : FUNDING : EST. - FY 77 / $ 10000
TASK/EPA CODE :G625B-EA-21 / R801136-06 (GRANT) PRIOR FY76 / $ 100001
PROJECT OFFICER : J DURHAM
INVESTIGATORS : J H LUNSFORD TEXAS A & M UNIVERSITY SYSTEM
MILE: 12/78 -FINAL REPORT

OBJECTIVES: THE OVERALL OBJECTIVE OF THIS RESEARCH IS TO DETERMINE THE STRUCTURE AND REACTIVITY OF ABSORBED OXIDES OF SULFUR. RESULTS FROM SUCH A STUDY WILL BE USEFUL IN IDENTIFYING THE PHOTOCHEMICAL AND THERMAL REACTIONS WHICH TAKE PLACE ON ATMOSPHERIC AEROSOLS. THE SPECIFIC GOALS DURING THE CURRENT YEAR WERE (A) TO DEVELOP PHOTOELECTRON INFRARED SPECTROSCOPY AS A TECHNIQUE FOR STUDYING OXIDES OF SULFUR ON AEROSOLS, (B) TO DETERMINE THE MECHANISMS FOR THE OXIDATION OF SO2 TO SO4 ON SURFACES, (C) TO IDENTIFY IONS SUCH AS S2O IONS AND H2S ION WHICH MAY BE PRODUCED DURING THE PHOTOCHEMICAL REACTION OF H2S WITH SO2 ON MAGNESIUM OXIDE. EMPHASIS IN FUTURE WORK WILL BE PLACED ON THE CATALYTIC OXIDATION OF SO2 IN FILMS OF ABSORBED WATER.

II-28

DEVELOP SULFURIC ACID GENERATOR FOR ULTRA FINE PARTICLES

START/ COMPL DATE :   06/76 - 12/77 : FUNDING : EST. - FY   77 / $ 15000
TASK/EPA CODE :G601B-CA-35 / R801301-0592(GRANT) PRIOR FY   /   1
PROJECT OFFICER : T G DZUBAY
INVESTIGATORS :   B Y LIU   UNIV. OF MINNESOTA
MILE: 02/78 -DELIVERY OF GENERATOR

OBJECTIVE: DEVELOP GENERATOR FOR SULFURIC ACID PARTICLES IN THE 0.02 TO 0.5 MICRON SIZE RANGE. THE AEROSOL GENERATOR IS TO BE DESIGNED FOR USE IN ANIMAL TEST CHAMBER STUDIES TO SIMULATE EXPOSURES TO SULFURIC ACID FROM CATALYST EQUIPPED VEHICLES. APPROACH: INTRODUCE SULFURIC ACID INTO AN AIR FLOW STREAM USING A SYRINGE PUMP. THE AIR STREAM IS HEATED AND THEN COOLED TO CAUSE EVAPORATION OF THE ORIGINAL DROPLETS AND CONDENSATION INTO SMALLER ONES. PARTICLE SIZE IS CONTROLLED BY ADJUSTING THE AMOUNT OF DILUTION AND THE RESIDENCE TIME. CURRENT PLANS/PROGRESS: THE SULFURIC ACID IS BEING INSTALLED IN AN 0.33 M3 ANIMAL EXPOSURE CHAMBER, WHERE ITS PERFORMANCE WILL BE EVALUATED. PARTICULAR CARE WILL BE TAKEN TO LIMIT THE CONCENTRATION AND RESIDENCE TIME FOR PARTICLES IN THE 0.02 - 0.05 MICRON RANGE TO PREVENT CHANGE OF PARTICLE SIZE BY COAGULATION.

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CAPE COD WASTEWATER RENOVATION AND RETRIEVAL SYSTEM

   START/ COMPL DATE :    06/73 - 04/78 : FUNDING : EST. - FY   77  / $  100000
    TASK/EPA CODE :L611C-45       / S802037     (GRANT)  PRIOR  FY76 / $  3884861
   INVESTIGATORS :   B H KETCHUM                      WOODS HOLE OCEANOGRAPHIC INST
                     R F VACCARO                      WOODS HOLE OCEANOGRAPHIC INST
                     P E KALLIO                       WOODS HOLE OCEANOGRAPHIC INST
                     A   MANN                         WOODS HOLE OCEANOGRAPHIC INST
   MILE: 06/74 -COMPLETE CONSTRUCTION OF EXPERIMENTAL IRRIGATION PLOTS AND INST
         07/75 -INTERIM REPORT ON 1ST YEAR OF OPERATION
         07/76 -INTERIM REPORT ON 2ND YEAR OF OPERATION
         07/77 -INTERIM REPORT ON 3RD YEAR OF OPERATION
         05/78 -FINAL PROJECT REPORT
     THE CAPE COD WASTEWATER RENOVATION AND RETRIEVAL SYSTEM IS EVALUATING
     ALTERNATIVE MEANS OF WASTEWATER TREATMENT AND DEVELOPING DESIGN CR
     ITERIA FOR THE RECHARGE OF WATER OF POTABLE QUALITY TO THE GROUNDWATER RES
     ERVOIR OF THE COASTAL OUTWASH PLAINS OF CAPE COD. THIS FOUR-YEAR STUDY INV
     OLVES INVESTIGATION OF THE IN SITU PERFORMANCE OF (1) THE SAND FILTER BEDS
     AT OTIS AIR FORCE BASE (2) SELECTED VARIETIES OF ANIMAL FORAGE GR
     ASSES, AND (3) VARIOUS RATES OF APPLICATION OF SECONDARY EFFLUENT. THE QUA
     NTITY AND QUALITY OF THE TREATED WATER AND ITS INFLUENCE ON THE QUALITY OF
      THE RECEIVING GROUND WATER, AND THE CHARACTER OF THE SOIL IS BEING
     CAREFULLY EXAMINED TO PROJECT EVENTUAL WATER CONDITIONS AFTER MANY
     YEARS OF OPERATION.
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II-30

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REACTIONS OF SO2 AND TERPENES WITH URBAN AEROSOLS

    START/ COMPL DATE :    04/73 - 11/79 : FUNDING : EST. - FY   77  / $   6000C
     TASK/EPA CODE :G603A-AE-10  / R802160-0482(GRANT)  PRIOR  FY76 / $   500001
    PROJECT OFFICER : -    WILSON
    INVESTIGATORS :   S K FRIEDLANDER                 CALIF. INST. OF TECHNOLOGY
    MILE: 11/79 -FINAL REPORT
      MEASURE THE CONVERSION RATE OF SO2, TERPENES, AND AROMATIC COMPOUNDS WITH
     LOS ANGELES AEROSOLS. THE GROWTH RATE OF THE AEROSOL AND THE INFLUENCE OF
       SIZE ON THE CONVERSION WILL BE DETERMINED FOR SAMPLES CONTAINED IN
     TRANSPARENT BAGS.
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A GUIDE FOR COMPREHENSIVE PLANNING FOR CONTROL OF URBAN STORM AND
COMBINED SEWER RUNOFF
   START/ COMPL DATE :    06/73 - 12/78 : FUNDING : EST. - FY   77  / $   59710
    TASK/EPA CODE :C611A-7095   / R802411     (GRANT)  PRIOR  FY76 / $  2241841
   PROJECT OFFICER : A N  TAFURI
   INVESTIGATORS :    W   HUBER                    STATE UNIVERSITY OF FLA. SYS.
                      J   HEANEY                   STATE UNIVERSITY OF FLA. SYS.
   MILE: 06/73 -START SWMM REFINEMENT
         03/75 -SWMM VERSION II COMPLETE
         10/76 -DESKTOP PLANNING METHODOLOGY
         04/77 -BMP EVALUATION
         12/77 -MULTIPURPOSE ANALYSIS AND STORAGE OPTIMIZATION
         02/78 -SWMM VERSION III
         12/78 -COMPLETION
     THIS PROJECT IS AN ONGOING STUDY TO PROVIDE EXTENSIVE REVISIONS/RE
     FINEMENTS TO THE STORM WATER MANAGEMENT MODEL (SWMM) USER'S MANUAL AS WELL
     AS THE MODEL ITSELF. THE OBJECTIVES OF THE CONTINUOUS WORK ARE: (1) TO
     DEVELOP A MULTI-PURPOSE ANALYSIS METHODOLOGY FOR WET-WEATHER POLLUTION CON
     TROL, AND (2) TO EVALUATE THE COST-EFFECTIVENESS OF THIS ANALYSIS BASED ON
     RECEIVING WATER IMPACTS. THE METHODOLOGY WILL BE FORMULATED FROM AN
     ALREADY ACCEPTED TECHNIQUE USED IN THE ELECTRIC UTILITY INDUSTRY FOR SAT
     ISFYING CONSUMER DEMAND IN THE MOST OPTIMUM MANNER. THIS TECHNIQUE WILL BE
     ADAPTED TO FINDING THE OPTIMAL MIX OF BEST MANAGEMENT PRACTICES, ST
     ORAGE-TREATMENT DEVICES, AND TREATMENT PLANTS TO SATISFY A GIVEN RECEIVING
     WATER CRITERIA (DO).
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EXPERIMENTAL STUDY OF AEROSOL FORMATION MECHANISMS IN A CONTROLLED ATMOSPHERE

START/ COMPL DATE : 06/73 - 03/77 : FUNDING : EST. - FY 77 / $ 77000
TASK/EPA CODE :G603A-AC-14 / R802472-03 (GRANT) PRIOR FY76 / $ 620001
PROJECT OFFICER : J DURHAM
INVESTIGATORS : D L FOX UNIV. OF NORTH CAROLINA
P C REIST UNIV. OF NORTH CAROLINA

MILE: 06/78 -LABORATORY DATA FOR TEST OF INTEGRATED CHEMICAL AND PHYSICAL MO
OBJECTIVES OF THIS PROJECT DURING THE THIRD BUDGET PERIOD. THIS PROGRAM HAS DESIGNED AND BUILT AN OUTDOOR CHAMBER FACILITY FOR THE INVESTIGATION OF AEROSOL FORMATION PROCESSES SIMILAR TO THOSE OCCURRING IN THE AMBIENT ATMOSPHERE. DURING THE SECOND BUDGET PERIOD, EXPERIMENTAL METHODS AND PROCEDURES WERE DEVELOPED OR ADAPTED FOR THIS PROJECT AND AN EXPERIMENTAL PROGRAM IS NOW IN PROGRESS. THE OVERALL OBJECTIVES OF THIS BUDGET PERIOD WILL BE TO INVESTIGATE GAS TO PARTICLE CONVERSION PROCESSES. THIS WILL BE ACCOMPLISHED BY CONDUCTING CHAMBER EXPERIMENTS IN THREE AREAS: SULFATE AEROSOL FORMATION IN HYDROCARBON-NOX SYSTEMS, SO2-NOX PLUME SYSTEMS AND SYSTEMS CONTAINING METALLIC SEED NUCLEI. DURING THIS COMING PERIOD ADDITIONAL EXPERIMENTS WILL BE CONDUCTED ON THIS SYSTEM. AEROSOL PARAMETERS TO BE OBTAINED INCLUDE CONDENSATION NUCLEI COUNT, SIZE DISTRIBUTIONS BY ELECTRIC AEROSOL ANALYZER AND FILTER SAMPLES FOR SULFATE ANALYSIS BY X-RAY FLUORESCENCE AND FLASH VAPORIZATION FLAME PHOTOMETRIC DETECTION. THE HYDROCARBON-NOX-SO2 SYSTEM IS AN ANALOG OF AEROSOL FORMATION IN URBAN AREAS WITH MULTIPLE SOURCES OF POLLUTION, STATIONARY AND MOBILE. THE SECOND AREA OF RESEARCH INVOLVES THE SO2-NOX SYSTEM AS AN ANALOG OF THE PROCESSES OCCURRING IN A POWER PLANT PLUME. A SERIES OF EXPERIMENTS WITH VARIOUS INITIAL CONCENTRATIONS OF SO2, NO, NO2 AND WATER VAPOR WILL BE CONDUCTED. THE THIRD MAJOR AREA OF RESEARCH WILL BE GENERATION OF AEROSOLS IN THE PRESENCE OF SEED NUCLEI. EXISTING AEROSOLS PROVIDE AN ALTERNATE OXIDATION PROCESS FOR CONVERSION OF SO2 TO SULFATE. METALLIC NUCLEI WILL BE INTRODUCED INTO THE CHAMBER AND THE SIZE DISTRIBUTION WILL BE DETERMINED, THEN SO2 WILL BE INTRODUCED AND EVOLUTION OF THE AEROSOL WILL BE MEASURED.

ACOUSTICAL SYSTEM TO PREVENT HAZARDOUS MATERIAL DIKE FAILURES

START/ COMPL DATE :   06/73 - 09/78 : FUNDING : EST. - FY 77 / $ 30000
TASK/EPA CODE :B610A-191   / R802511-01 (GRANT) PRIOR FY76 / $ 1750001
PROJECT OFFICER : J E BRUGGER
INVESTIGATORS :   R M KOERNER   DREXEL UNIVERSITY
A E LORD   DREXEL UNIVERSITY

MILE: 02/73 -FUNDING PACKAGE SUBMITTED
06/73 -AWARD FUNDS FOR PROJECT
09/76 -COMPLETE PROTOTYPE
01/77 -ADD FUNDS/TIME EXTENSION
06/77 -ADD FUNDS/TIME EXTENSION
09/78 -FINAL REPORT RECEIVED

DEVICES TO PROVIDE EARLY WARNING OF POTENTIAL SPILLS OF IMPOUNDED HAZARDOUS MATERIALS WILL BE DEVELOPED AND DEMONSTRATED. THE TECHNIQUE TO BE USED IS BASED UPON THE DETECTION OF STRESS WAVES (ACOUSTICAL EMISSIONS) THAT ARE GENERATED BY INTER-PARTICLE (SHEARING) MOVEMENT WITH THE EARTHEN (SOIL) DIKE MATERIAL AS THE MATERIAL REACTS TO ACCOMMODATE TO THE STRESS APPLIED BY THE PRESSURE OF THE STORED HAZARDOUS MATERIALS. THE ACOUSTICAL EMISSIONS ARE MOST INTENSE DURING CHANGE IN STRESS LOADING BUT ALSO CONTINUE DURING THE RATHER LONG PERIODS OF RELAXATION (ACCOMMODATION AND PARTICLE REARRANGEMENT) THAT OCCUR SUBSEQUENTLY TO CHANGES IN STRESS (LOADING). THE BEHAVIOR HAS BEEN CORRELATED WITH STRESS LEVEL FOR MANY TYPES OF SOILS USED TO CONSTRUCT EARTHEN DAMS. METAL ACOUSTICAL "WAVE GUIDES" ARE INSERTED INTO THE DIKES AND THE TRANSMITTED SOUND (RANGE 500 HZ (CYCLES/SEC) TO 2 KHZ) ARE CONVERTED TO ELECTRICAL ANALOGUES BY A PIEZOELECTRIC TRANSDUCER AND RECORDED AND ANALYZED. INTERPARTICLE FRICTIONAL ACOUSTICAL EMISSIONS IN SANDY SOILS, AS WELL AS COHESIVE BOND BREAKING IN CLAY SOILS, ARE DETECTABLE. THE PROJECT IS DIVIDED INTO TWO CONSECUTIVE PHASES, THE FIRST OF WHICH INCLUDES LABORATORY STUDIES ON SOIL SAMPLES AND PRELIMINARY FIELD TESTING ON ACTUAL EARTHEN DIKES. THE SECOND PHASE CONTINUES THE LABORATORY WORK AND EXPANDS THE FIELD TESTING TO A NUMBER OF DIKES OVER A LONG TIME PERIOD. THE PRODUCT OF THIS PROJECT WILL BE A REPORT AND A PORTABLE, EASY-TO-USE, EARLY WARNING DEVICE TO IDENTIFY PRONE-TO-FAILURE DIKES, OR SECTIONS THEREOF, AND THEREBY TO WARN OF POTENTIAL HAZARDOUS MATERIAL SPILL SITUATIONS. THE SYSTEM IS NOW OPERATIONAL AND HAS BEEN USED AT TWENTY-FIVE SITES; THREE OF THESE WERE FOUND TO BE UNSTABLE AND PROMPT PREVENTIVE ACTION WAS TAKEN SO THAT SPILLAGES/DIKE FAILURES DID NOT OCCUR. SEVERAL CORPORATIONS IN THE CHEMICAL PROCESSING AND METAL/NON-METAL MINING INDUSTRIES ARE INVESTIGATING/INSTALLING THE SYSTEM.

II-34

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QUANTITATIVE METHODS FOR VIRUS IN WATER

   START/ COMPL DATE :    07/73 - 05/78 : FUNDING : EST. - FY   77  / $   90000
    TASK/EPA CODE :A713C-29      / R802736-03  (GRANT)  PRIOR  FY76 / $  1190001
   PROJECT OFFICER : R    SAFFERMAN
   INVESTIGATORS :    J L MELNICK                       BAYLOR COLLEGE OF MEDICINE
                      C P GERBA                         BAYLOR COLLEGE OF MEDICINE
                      C   WALLIS                        BAYLOR COLLEGE OF MEDICINE
                      S   FARRAH                        BAYLOR COLLEGE OF MEDICINE
                      S M GOYAL                         BAYLOR COLLEGE OF MEDICINE
   MILE: 05/78 -FINAL REPORT
    QUANTITATIVE STUDIES WILL BE CONDUCTED TO FURTHER DEVELOP AND IMPROVE
    METHODS FOR THE EFFICIENT DETECTION OF SMALL QUANTITIES OF ENTERIC VIRUSE
    S (I.E., ENTEROVIRUSES, ADENOVIRUSES, REOVIRUSES AND ROTAVIRUSES) IN LARGE
     VOLUMES OF RAW AND TREATED POTABLE WATER. THE ENHANCED RESISTANCE OF
     SOLID-ASSOCIATED VIRUSES TO VARIOUS ENVIRONMENTAL FACTORS AND TO D
    ISINFECTION EMPHASIZE THE NEED TO DEVELOP SYSTEMS FOR THEIR DETECTION IN W
    ATER. THEREFORE, EXISTING VIRUS CONCENTRATION METHODS WILL BE STUDIED AND,
    IF NECESSARY, MODIFIED FOR THE DETECTION OF SOLID-ASSOCIATED VIRUSES.
    CURRENT TISSUE CULTURE TECHNIQUES REQUIRE SEVERAL DAYS OR LONGER FOR THE
    DEMONSTRATION OF VIRUS IN CONCENTRATES FROM WATER. NEW TECHNOLO
    GY, SUCH AS RADIO-IMMUNOASSAY, ALLOWS THE RAPID IDENTIFICATION OF VIRUSES,
    IF PRESENT IN SUFFICIENT CONCENTRATION. WE PROPOSE TO PURSUE THE DEV
    ELOPMENT OF THESE METHODS FOR THEIR APPLICATION TO VIRUS CONCENTRATES FROM
    WATER IN ORDER TO REDUCE THE TIME NECESSARY FOR THE DETECTION OF
    VIRUSES IN WATER.
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MATHEMATICAL METHODS FOR X-RAY ANALYSIS

   START/ COMPL DATE :    05/74 - 05/78 : FUNDING : EST. - FY   77  / $   25000
    TASK/EPA CODE :G712B-BE-60  / R802759      (GRANT)  PRIOR  FY76 / $   350001
   PROJECT OFFICER : -     DZUBAY
   INVESTIGATORS :   R P GARDNER                      UNIV. OF NORTH CAROLINA
   MILE: 05/78 -FINAL REPORT
     DEVELOP METHODS TO CORRECT FOR GAIN SHIFT, BASELINE DRIFT, INTERELEMENT
     EFFECTS, AND BACKGROUND SUBTRACTION.
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EFFECT OF CYANIDE ON FRESHWATER INVERTEBRATES

   START/ COMPL DATE :    12/73 - 06/78 : FUNDING : EST. - FY   77  / $  131826
    TASK/EPA CODE :N608A-075    / R802914     (GRANT)  PRIOR  FY76 / $   980001
   PROJECT OFFICER : R    DRUMMOND
   INVESTIGATORS :   L    SMITH                       UNIV. OF MINNESOTA
   MILE: 11/77 -FINAL REPORT - VOLUME 1
     THE OBJECTIVES OF THIS PROJECT ARE TO DETERMINE THE ACUTE AND CHRONIC
     EFFECTS OF CYANIDE, CYANIDE COMPLEXES, AND OTHER INORGANIC AND ORGANIC
     MATERIALS ON FRESHWATER FISH AND INVERTEBRATES. SUBSIDIARY OBJECTIVES
      ARE (A) TO DETERMINE EFFECTS OF TEMPERATURE, PH, AND OXYGEN ON CYANIDE
      TOXICITY; (B) TO DETERMINE ADDITIVE OR SYNERGISTIC RELATIONSHIPS BE
     TWEEN HEAVY METALS AND CYANIDE; (C) TO DETERMINE WHICH LIFE HISTORY STAGES
     OF FISH AND INVERTEBRATES ARE THE MOST SENSITIVE; (D) TO DETERMINE APPL
     ICATION FACTORS WHICH CAN BE APPLIED TO SHORT TERM TEST RESULTS TO PREDICT
     SAFE LEVELS OF CYANIDE OR CYANIDE COMPLEXES; (E) TO DETERMINE
     CUMULATIVE EFFECTS OF CYANIDE ON SUCCESSIVE GENERATIONS OF FISH; (F) TO
     DETERMINE THE ACUTE TOXICITY OF VARIOUS COMPOUNDS TO DAPHNIA MAGNA AND
     FATHEAD MINNOWS; (G) TO DETERMINE THE EFFECTS OF THESE MATERIALS ON THE E
     MBRYOS AND THE LARVAE OF FATHEAD MINNOWS AND, (H) TO DETERMINE THE EFFECTS
     OF THESE MATERIALS ON DAPHNIA MAGNA IN A LIFE CYCLE TEST. THESE OBJECTIVES
      ARE CONSIDERED TO BE IMPORTANT BECAUSE CHRONIC EFFECTS OF CYANIDE
     AND MANY OTHER TOXICANTS HAVE NOT BEEN DESCRIBED.
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IDENTIFY ORGANICS IN CHLORINATED MUNICIPAL WASTES

   START/ COMPL DATE :    03/74 - 07/79 : FUNDING : EST, - FY   77  / $   56300
    TASK/EPA CODE :K614D-134    / R803007-03  (GRANT)  PRIOR  FY76 / $   492001
   PROJECT OFFICER : A W  GARRISON
   INVESTIGATORS :    W H GLAZE                     NORTH TEXAS STATE UNIVERSITY
   MILE: 10/75 -PUBLISHED REPORT "FORMATION OF ORGANOCHLORINE COMPOUNDS FROM TH
         10/76 -REPORT ON TOTAL ORGANIC CHLORINE (TOCL) METHOD
         06/77 -REPORT ON CHLORINATED NON-VOLATILE COMPOUNDS IN CHLORINATED MUN
     THE OBJECTIVE IS TO ISOLATE AND IDENTIFY CHLORINATED ORGANIC COMPOUNDS P
     RODUCED DURING CHLORINATION TREATMENT OF MUNICIPAL SEWAGE, WORK FALLS INTO
     THREE PHASES: (1) EXAMINATION OF EXTRACTS OF CHLORINATED MUNICIPAL
      WASTEWATERS FROM SEVERAL LOCATIONS BY GC-MS, (2) DEVELOPMENT OF A TOTAL
       CARBON-BOUND CHLORINE ANALYZER FOR MONITORING CHLORINATED WAS
     TEWATERS, AND (3) SEPARATION AND IDENTIFICATION OF CHLORINATED AMINO ACIDS
     AND OTHER NON-VOLATILES IN CHLORINATED WASTEWATERS,
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A STUDY OF THE IDENTITY AND SOURCES OF DENVER'S AEROSOLS

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START/ COMPL DATE :    06/75 - 06/78 : FUNDING : EST, - FY   77  / $   15000
 TASK/EPA CODE :G625B-EA-09  / R803078      (GRANT)  PRIOR  FY76 / $   200001
PROJECT OFFICER : -     DURHAM
INVESTIGATORS :    R G DRAFTZ                     I I T RESEARCH INSTITUTE
                   J D STOCKHAM                   I I T RESEARCH INSTITUTE
                   J   GRAF                       I I T RESEARCH INSTITUTE
MILE: 09/76 -FINAL REPORT
      12/77 -FINAL REPORT
      09/78 -FINAL REPORT
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THE CITY OF DENVER EXPERIENCES OVER 200 ATMOSPHERIC INVERSIONS EACH YEAR WHICH PRODUCE HAZE AND DECREASED VISIBILITY OVER SIGNIFICANT PORTIONS OF DENVER, IN 1973, THE U.S. EPA BEGAN A RESEARCH STUDY TO DETERMINE THE CAUSE AND SOURCES OF THIS POLLUTION PROBLEM, ONE IMPORTANT ASPECT OF THE STUDY INVOLVES THE IDENTIFICATION OF AEROSOLS COLLECTED FROM THE ATMOSPHERE. IN A PREVIOUS PRELIMINARY STUDY (1972), POLARIZED LIGHT MICROSCOPY WAS USED SUCCESSFULLY TO IDENTIFY MANY OF THE AEROSOL PARTICLES, THE GOAL OF THIS CURRENT PROPOSED STUDY IS TO TRACE THE SOURCES OF AEROSOL PARTICLES COLLECTED BY THE EPA AND OTHER AGENCIES AT A NETWORK OF SAMPLING STATIONS, BY IDENTIFYING THE TYPES OF PARTICLES AND COMPARING THEM TO REFERENCE SAMPLES, THE PARTICLES WILL BE CHARACTERIZED AND IDENTIFIED BY POLARIZED LIGHT MICROSCOPY SUPPLEMENTED WITH SCANNING ELECTRON MICROSCOPY AND MASS SPECTROMETRY, THE DATA FROM THESE ANALYSES WILL BE CORRELATED WITH METEOROLOGICAL AND AEROSOL DATA TO DISCOVER THE IMPACT OF INDIVIDUAL SOURCES IN PRODUCING HAZE,

MORPHOLOGY OF ATMOSPHERIC AEROSOLS

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   START/ COMPL DATE :    07/75 - 10/77 : FUNDING : EST. - FY   77  / $   10000
    TASK/EPA CODE :G603A-AH-05  / R803078-04  (GRANT)  PRIOR  FY76 / $   180001
   PROJECT OFFICER : -    DURHAM
   INVESTIGATORS :       DRAFTZ                        ILLINOIS INST. OF TECHNOLOGY
   MILE: 10/77 -FINAL REPORT
     THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO
     OTHERS. APPLY THE TECHNIQUES OF LIGHT AND ELECTRON MICROSCOPY TO DETERMINE
     THE MORPHOLOGY OF ATMOSPHERIC AEROSOLS.
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II-40

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EFFECTS OF SURFACE CONFIGURATION IN WATER POLLUTION CONTROL ON SEMI-ARID
 MINED LANDS
   START/ COMPL DATE :    09/77 - 09/78 : FUNDING : EST. - FY   77  / $  200000
    TASK/EPA CODE :36238-353     / R803079-04  (GRANT)  PRIOR  FY76 / $ 10470001
   PROJECT OFFICER : J F  MARTIN
   INVESTIGATORS :   R L HODDER                    MONTANA STATE UNIVERSITY
                     I B JENSEN                    MONTANA STATE UNIVERSITY
                     D   DOLLHOPF                  MONTANA STATE UNIVERSITY
                     D   HALK                      MONTANA STATE UNIVERSITY
                     J   OLSON                     MONTANA STATE UNIVERSITY
                     W   VANVOAST                  STATE BUR. OF MINES & GEOL.
   MILE: 00/74 -FUNDING PACKAGE SUBMITTED
         00/74 -AWARD FUNDS
         11/78 -FINAL REPORT RECEIVED
     OBJECTIVES OF THIS STUDY ARE TO DEMONSTRATE THE EFFECTIVENESS OF SEVERAL
     SURFACE CONFIGURATIONS IN: CONTROLLING EROSION, RUNOFF, SEDIMENTATION AND
     POLLUTION OF ADJACENT DRAINAGES; QUICKLY PRODUCING A DESIRABLE STABILIZING
      VEGETATIVE COVER; CREATING AN EQUILIBRIUM BETWEEN PRECIPITATION ABSORBED
     AND SOIL MOISTURE EVAPORATED AND TRANSPIRED SO THAT GROUND WATER
     POLLUTION WILL REMAIN MINIMAL; PRODUCING AN OVERALL DESIRABLE RECLAMATION
     DESIGN PROVIDING EFFECTIVE DRAINAGE, ESTHETICS, PRODUCTIVENESS A
     ND USE. DEMONSTRATION AREAS APPROXIMATELY 16 HECTARES IN SIZE WERE LOCATED
     ON RESHAPED SPOILS OF STRIP MINED COAL MINES NEAR COLSTRIP, MT; SAVA
     GE, MT; BEULAH, ND; HANNA, WY; AND GLENROCK, WY. FIVE TREATMENTS EVALUATED
      INCLUDE DEEP CHISELING IN TOPSOIL, DEEP CHISELING NO TOPSOIL, GOU
     GING IN TOPSOIL, GOUGING NO TOPSOIL AND DOZER BASINS IN TOPSOIL. FIVE 0.21
     HECTARE MICROWATERSHEDS HAVE BEEN CONSTRUCTED AT EACH AREA TO AID IN
     INTENSIVELY EVALUATING EACH TREATMENT. TREATMENT EVALUATION AT EACH AREA I
     NCLUDE: METEOROLOGICAL MONITORING, SURFACE RUNOFF WATER QUALITY, SOIL MOIS
     TURE, EVAPOTRANSPIRATION RATE, WATER AQUIFER LEVELS. IMPLEMENTATION OF THE
      FIVE AREAS HAS BEEN COMPLETED AND DATA IS BEING COLLECTED AND PROCESSED.
      THE FIRST REPORT WILL BE PUBLISHED DURING 1977. TREATMENT EVALUATIONS ARE
      SCHEDULED THROUGH SEPTEMBER 12, 1978.
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DEVELOPMENT OF PROCEDURES BASED ON HEPATIC TOXICITIES TO EVALUATE
EFFECTS OF CHRONIC EXPOSURE OF FISHES TO ENVIRONMENTAL CONTAM
   START/ COMPL DATE :    00/00 - 00/00 : FUNDING : EST. - FY   77  / $   23118
    TASK/EPA CODE :N608A-078    / R803090-04  (GRANT)  PRIOR  FY76 / $   218161
   PROJECT OFFICER : J M  MCKIM
   INVESTIGATORS :    L J WEBER                           OREGON STATE HIGHER EDUC. SYS
                      W K SEIM                            OREGON STATE HIGHER EDUC. SYS
                      W K GINGERICH                       OREGON STATE HIGHER EDUC. SYS
   MILE: 09/78 -EVALUATION OF ORGAN FUNCTION TESTS WITH FISH TO PREDICT CHRONIC
     THE PROPOSED WORK IS TO INVESTIGATE THE FEASIBILITY OF UTILIZING FOR
    FISHES CLINICAL PROCEDURES WHICH ARE ACCEPTED IN DETERMINING THE STATUS OF
     SPECIFIC ORGAN FUNCTION IN MAN. THE RELATIVE HEPATOTOXICITY OF TWO
     CHOLORINATED BENZENE COMPOUNDS, HEXACHLOROBENZENE AND 1, 2, 4,
      TRICHLOROBENZENE WILL BE INVESTIGATED IN RAINBOW TROUT (SALMA
    GAIRDNERI). THE HEPATOTOXICITY OF EACH COMPOUND TO TROUT WILL BE ASSESSED
    THROUGH CLINICAL PROCEDURES WHICH HAVE PREVIOUSLY BEEN ESTABLISHED AS
    SENSITIVE INDICATORS OF LIVER FUNCTION IN THIS FISH. HISTOPATHOLOGICAL
    STUDIES WILL BE CONDUCTED TO CORRELATE SPECIFIC LIVER PATHOLOGY WITH THE
    DEGREE OF APPARENT FUNCTIONAL IMPAIRMENT. THE STUDY WILL EVALUATE
    LIVER FUNCTION IN THE TROUT FOLLOWING REGIMES OF BOTH SUBACUTE AND CHRONIC
    EXPOSURE TO THE PROPOSED TOXICANTS.
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TECHNIQUES FOR THE MEASUREMENT OF AEROSOL SIZE DISTRIBUTION AND CARBON AND SULFUR CONTENT

START/ COMPL DATE : 10/76 - 10/79 : FUNDING : EST. - FY 77 / $ 50000
TASK/EPA CODE :G625B-EB-08 / R803115-03 (GRANT) PRIOR FY76 / $ 250001
PROJECT OFFICER : C SAWICKI
INVESTIGATORS : E S MACIAS WASHINGTON UNIVERSITY
R B HUSAR WASHINGTON UNIVERSITY
MILE: 11/79 -FINAL REPORT

OBJECTIVES AND APPROACH: TO PURSUE WORK IN THREE DISTINCT AREAS OF AEROSOL INSTRUMENTATION AND CHARACTERIZATION. THESE INCLUDE DEVELOPMENT OF (A) A SHAPE SENSITIVE AEROSOL PARTICLE SIZE SPECTROMETER, (B) A NUCLEAR GAMMA-RAY METHOD TO MEASURE THE CONCENTRATIONS OF LIGHT ELEMENTS SUCH AS CARBON, NITROGEN, OXYGEN AND SULFUR AND (C) A PARTICULAR SULFUR ANALYZER. CURRENT PLANS/PROGRESS: DURING THE CURRENT PERIOD THE DEVICE AND TECHNIQUES TO MEASURE PARTICLE SIZE HAVE BEEN DOCUMENTED WITH LABORATORY AEROSOLS. ADDITIONAL MEASUREMENTS ON ATMOSPHERIC AEROSOLS WILL BE MADE IN THE UPCOMING PERIOD. IN THIS PERIOD THE NUCLEAR GAMMA-RAY METHOD WAS BROUGHT INTO ROUTINE OPERATION FOR ALL ELEMENTS EXCEPT OXYGEN, AND THIS ANALYTICAL TECHNIQUE WILL BE DEVELOPED IN THE NEXT PERIOD. SOME WORK HAS ALSO BEEN DONE ON THE IN-SITU ANALYSIS OF SULFATE AEROSOLS USING THERMAL ANALYSIS TECHNIQUES. A MALLOY FPD SULFUR ANALYZER WAS OBTAINED AND LABORATORY TESTED AND CALIBRATED AND WILL BE FIELD TESTED UNDER A VARIETY OF CONDITIONS IN THE NEXT YEAR.

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EVALUATION AND TECHNOLOGY TRANSFER OF THE SWIRL CONCENTRATOR PRINCIPLE

   START/ COMPL DATE :    01/75 - 10/78 : FUNDING : EST. - FY   77  / $   28200
    TASK/EPA CODE :C611A-7222    / S803157      (GRANT)  PRIOR  FY75 / $  650001
   PROJECT OFFICER : H     MASTERS
   INVESTIGATORS :     R H SULLIVAN                        AMER. PUBLIC WORKS ASSN.
                       W E KORBITZ                         AMER. PUBLIC WORKS ASSN.
                       E H BALDOCK                         AMER. PUBLIC WORKS ASSN.
                       M M KLEGERMAN                       AMER. PUBLIC WORKS ASSN.
                       E   URE                             AMER. PUBLIC WORKS ASSN.
  MILE: 02/75 -START
        06/75 -INSTALLATION OF PILOT SWIRLS (GRITS) AND (PRIMARY) COMPLETE
        07/76 -EVALUATION OF SWIRL DEGRITTER COMPLETE
        07/77 -FINAL REPORT ON SWIRL DEGRITTER PUBLISHED
        07/77 -EVALUATION OF SWIRL PRIMARY SEPARATION COMPLETE
        10/77 -CONTINUATION FUNDING PACKAGE (DESIGN OPTIMIZATION/TEXTBOOK)
        10/78 -CONTINUATION PORTION OF PROJECT COMPLETED
        03/79 -FINAL REPORT ON DESIGN OPTIMIZATION OF SWIRL DEVICES, COMPLETE
   THE OVERALL OBJECTIVE OF THIS DEMONSTRATION PROJECT IS TO PROVIDE VEHICLES
    FOR THE RAPID DISSEMINATION OF INFORMATION CONCERNING THE
   SWIRL CONCENTRATOR AND THE HELICAL BEND REGULATOR. TECHNOLOGY TRANSFER
   IN THE FIELD OF PUBLIC WORKS IS BEST ACCOMPLISHED BY EVALUATION OF PRO
   TOTYPE CONTROL FACILITIES. THE FOUR PARTS OF THIS PROPOSAL ARE DESIGNED TO
   PROVIDE THE BASIS FOR TRANSFER OF THE TECHNOLOGY TO THE PROFESSION. THE F
   OUR PARTS ARE: A. EVALUATION OF A SWIRL CONCENTRATOR GRIT CHAMBER; B. EVAL
   UATION OF A SWIRL CONCENTRATOR PRIMARY TECHNICAL DEVICE; C. PREPARATION OF
   A TEXTBOOK ON DESIGN OF FACILITIES UTILIZING SECONDARY MOTIONS; D.
   OPTIMIZE, THROUGH LABORATORY CONFIRMATION, THE SWIRL DESIGN CURVES
   TO COVER SMALLER TREATMENT INFLOW CAPACITIES THAN NOW EXIST.
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CHLORINATED HYDROCARBON PESTICIDE REMOVAL FROM WASTEWATER

  START/ COMPL DATE :    05/74 - 03/78 : FUNDING : EST. - FY   77  / $   94085
   TASK/EPA CODE :F610B-02      / S803159      (GRANT)  PRIOR  FY74 / $  2218001
  PROJECT OFFICER : D K  OESTREICH
  INVESTIGATORS :    D R MARKS                     VELSICOL CHEMICAL CORPORATION
  MILE: 05/76 -COMPLETION OF CONSTRUCTION AND INSTALLATION OF CATALYTIC REDUCT
        05/76 -INITIAL TESTING OF CATALYTIC REDUCTION SYSTEM
        10/76 -COMPLETION OF CONSTRUCTION OF XAD RESIN SYSTEM
        12/76 -START-UP OF RESIN SYSTEM
        03/77 -SUCCESSFUL REGENERATION OF RESIN BED #1, START-UP ON BED #2
        05/77 -ACHIEVEMENT OF LESS THAN 10 PPB IN EFFLUENT ON A ROUTINE BASIS
        03/78 -COMPLETION OF PROGRAM AND FINAL REPORT
    OBJECTIVES: TO DEMONSTRATE, AT THE PILOT PLANT LEVEL, TWO DIFFERENT CONT
    ROL TECHNOLOGIES, (CATALYTIC REDUCTIVE DEGRADATION AND RESIN SORPTION) FOR
    THE CONTROL OF ENDRIN, HEPTACHLOR AND OTHER TOXIC CHLORINATED HYDROCAR
    BON INTERMEDIATES IN PESTICIDE MANUFACTURING WASTEWATER. TARGETED EFFLUENT
     QUALITY IS LESS THAN 1.55 PPB OF PESTICIDES. APPROACH: PILOT SCALE
    TESTING OF 100 GALLON PER MINUTE CONTROL DEVICES FOR BOTH TECHNOLOGIES TO
    OPTIMIZE PERFORMANCE AND DETERMINE RELIABILITY AND EFFICIENCIES OF
    THE CONTROL SYSTEMS. CURRENT PLANS AND PROGRESS: THE XAD RESIN SYSTEM HAS
    BEEN OPERATED FOR EIGHT MONTHS AND OPTIMIZED TO YIELD EFFLUENTS WHICH
    ROUTINELY CONTAIN NO MORE THAN 5 PPB. THE RESIN BED HAS BEEN SUCCESSFUL
    LY REGENERATED USING ISOPROPYL ALCOHOL AS THE SOLVENT SEVERAL TIMES. IT IS
    PLANNED TO OPERATE THE CATALYTIC REDUCTION SYSTEM IN TANDEM WITH THE RESIN
     SYSTEM TO ESTABLISH IF THE ENDRIN STANDARD OF 1.5 PPB CAN BE ACHIEVED.
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DEMONSTRATION OF CONNECTOR WELLS

  START/ COMPL DATE :    06/74 - 11/79 : FUNDING : EST. - FY   77  / $   40000
   TASK/EPA CODE :B623B-342    / S803191-01  (GRANT)  PRIOR  FY76 / $   520001
  PROJECT OFFICER : S J  HUBBARD
  INVESTIGATORS :   J   DEMCHALK
                    R R PARIZEK                       STATE DEPT. OF ENV. RESOURCES
                    V M BEARD                         PENN. STATE UNIVERSITY
  MILE: 05/74 -FUNDING PACKAGE SUBMITTED              STATE DEPT. OF ENV. RESOURCES
        06/74 -AWARD FUNDS FOR PROJECT
        05/77 -AMENDMENT TO GRANT
        11/79 -FINAL REPORT RECEIVED
    OBJECTIVE: TO STUDY THE FEASIBILITY AND EFFECTIVENESS OF USING GRAVITY
    CONNECTOR WELLS TO IMPROVE STREAM QUALITY BY REDUCING DRAINAGE FROM ABAND
    ONED DEEP COAL MINES. APPROACH: SELECT THE BEST SITE FOR DEMONSTRATING THE
     EFFECTIVENESS OF GRAVITY CONNECTOR WELLS FOR REDUCING DRAINAGE FROM
    ABANDONED DEEP COAL MINES. DETERMINE OPTIMUM NUMER AND LOCATION OF GRAVITY
    DRAINAGE WELLS AND ESTIMATE THE QUANTITY OF DRAINAGE THAT WILL BE ABATED.
    CURRENT PLANS: CURRENT PLANS ARE FOR CONDUCTING FEASIBILITY STUDY
     OF AN OPTIMUM DEMONSTRATION SITE AND DEVELOP PLANS AND SPECIFICATIONS FOR
     A FULL SCALE FIELD DEMONSTRATION OF THE TECHNIQUE. THE SITE WILL BE STUD
    IED TO DETERMINE ITS HYDROGEOLOGIC AND MINING CONDITIONS AFFECTING GRAVITY
     DRAINAGE OF RELATED AQUIFERS THAT WILL SIGNIFICANTLY REDUCE DEEP MINE
    DRAINAGE. THE STUDY WILL CAPITALIZE ON AVAILABLE DATA, BUT ALSO INCLUDE
    LIMITED DRILLING AND TESTING TO DETERMINE AQUIFER FLOW CHARACTERISTICS.
    FOLLOWING EVALUATION OF THE DEMONSTRATION SITE, CONTINUOUS MONITORING OF
    QUALITY AND QUANTITY OF DEEP MINE DISCHARGE WILL COMMENCE. DETAILED DESIGN
    PLANS FOR THE GRAVITY DRAINAGE WELLS WILL BE DETERMINED BASED ON THE
    HYDROGEOLOGY AND AQUIFER FLOW CHARACTERISTICS OF THE SITE. THE OPTIMUM
    LOCATION OF THE WELLS WILL BE DETERMINED BY STUDYING FRACTURE TRACE PATT
    ERNS AS RELATED TO AQUIFER FLOW CHARACTERISTICS AND HYDROGEOLOGY. BASED ON
    THE ABOVE, A DETERMINATION WILL BE MADE OF THE NUMBER AND LOCATIONS FOR
    CONSTRUCTING THE REQUIRED GRAVITY DRAINAGE WELLS. AS MANY AS FOUR
    CONNECTOR WELLS WILL BE CONSTRUCTED TO STUDY THE MINE DRAINAGE REDUCTION
    POSSIBLE FROM THIS TECHNIQUE.
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Supplemental funding to collect additional data through an additional operating season. Because of the critical importance of this project in the development of the overland-flow system, maximum data collection and evaluation is extremely desirable.

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COMBUSTION RESEARCH ON COAL NITROGEN AND PARTICULATE ORGANIC MATTER
  START/ COMPL DATE :    08/74 - 10/77 : FUNDING : EST. - FY   77  / $   20000
   TASK/EPA CODE :F624A-012     / R803242      (GRANT)  PRIOR  FY76 / $  3550001
  PROJECT OFFICER : J H  WASSER
  INVESTIGATORS :    A F SAROFIM
                     J B HOWARD                        MASS. INST. OF TECHNOLOGY
                     R   HITES                         MASS. INST. OF TECHNOLOGY
                                                       MASS. INST. OF TECHNOLOGY
  MILE: 08/75 -COMPLETE EXPERIMENTAL SYSTEMS AND INITIAL TEST
        08/76 -COMPLETE STUDY OF SOOT AND PCAH FORMATION IN TURBULANT DIFFUSIO
        08/76 -COMPLETE EVALUATION OF COMPOUND N BEHAVIOR FOR TWO COMMON COALS
        10/77 -FINAL REPORT
   TASK I. CHARACTERIZATION OF POM FROM DIFFUSION AND PREMIXED FLAMES. THE
   RESEARCH IS CONCERNED WITH THE QUALITATIVE AND QUANTITATIVE ASSESSMENT OF
   THE PRODUCTION OF PARTICULATE ORGANIC MATTER IN LABORATORY FLAMES.
   THE OBJECTIVES ARE TO DETERMINE WITHIN THE FLAME AND IN THE EXHAUST GASES
   (1) THE SIZE DISTRIBUTION AND CONCENTRATIONS OF SOOT PARTICLES, (2) THE
   IDENTITIES AND CONCENTRATIONS OF ORGANIC COMPOUNDS, (3) THE RELATIONSHIP
   BETWEEN SOOT AND ORGANIC COMPOUNDS GENERATED IN THE FLAME. EXPERIMEN
   TAL METHODOLOGY USED INCLUDES PARTICLE CONCENTRATION AND SIZE DISTRIBUTION
   BY ELECTRON MICROSCOPY, AND ANALYSIS OF POLYCYCLIC AROMATIC HY
   DROCARBON BY GAS CHOMATOGRAPHIC MASS SPECTROMETRY AND HIGH RESOLUTION MASS
   SPECTROMETRY. THE MAJOR EMPHASIS INVOLVES THE APPLICATION OF MOLECULAR
   BEAM SAMPLER AND ON-LINE MASS SPEC. FOR COMPLETE GAS PHASE ANALYSIS.
   ADDITIONAL INFORMATION IS OBTAINED BY SAMPLING ATMOSPHERIC PRESSURE
   TURBULENT DIFFUSION FLAMES AND LAMINAR PREMIXED FLAMES BY WATER-INJECTED
   SAMPLING PROBES. TASK II. KINETICS OF DEVOLATILIZATION OF NITROGEN
   COMPOUNDS DURING THE HIGH TEMPERATURE PYROLYSIS OF COAL. THE PROGRAM
   OBJECTIVES ARE TO OBTAIN A BETTER UNDERSTANDING OF THE PROCESSES CO
   NTRIBUTING TO THE EMISSION OF NOX FROM COAL FIRED BOILERS TO BETTER DEFINE
   CONTROL METHODS. FUEL BOUND NITROGEN COMPLICATES DEVELOPMENT OF LOW NOX B
   URNERS BECAUSE THE NITROGEN IN CHAR MAY PERSIST INTO THE SECOND STAGE OF A
   STAGED COMBUSTOR. DURING THE PAST TWO YEARS LABORATORY FURNACES HAVE
   BEEN DEVELOPED FOR THE PYROLYSIS AND OXIDATION OF PULVERIZED COAL UNDER
   CONDITIONS SIMULATING UTILITY BOILERS. RESULTS ON NITROGEN RETENTION IN
   CHAR HAVE BEEN DETERMINED FOR TWO COALS AS A FUNCTION OF TEMPERATURE AND
   TIME. ALSO, THE CONVERSION OF THE FUEL NITROGEN TO NOX HAS BEEN DETERMINED
   AS A FUNCTION OF FUEL/AIR RATIO FOR ONE FURNACE TEMPERATURE. FIVE ADDIT
   IONAL COALS WILL BE STUDIED OVER A WIDER RANGE OF TEMPERATURES AND DATA WI
   LL BE OBTAINED ON THE GAS PHASE CONSTITUENTS OF PYROLYSIS. THE COALS CHARS
    WILL BE CHARACTERIZED TO DEVELOP MECHANISTIC MODELS FOR EXTRAPOLATION
   OF DATA TO OTHER CONDITIONS.
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II-48

WATER QUALITY STUDIES ON RIVER NILE AND LAKE NASSER

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START/ COMPL DATE :    11/74 - 10/80 : FUNDING : EST. - FY   77  / $   30000
 TASK/EPA CODE :K609A-058    / R803291-04  (GRANT)  PRIOR  FY76 / $  200001
PROJECT OFFICER : W M  SANDERS
INVESTIGATORS :    K H MANCY                    UNIV. OF MICHIGAN
                   M S HILBERT                  UNIV. OF MICHIGAN
                   P G MEIER                    UNIV. OF MICHIGAN
                   R A DEININGER                UNIV. OF MICHIGAN
                   W J WEBER                    UNIV. OF MICHIGAN
MILE: 01/75 -PROJECT INITIATION
      01/76 -1ST PROGRESS REPORT
      10/77 -2ND PROGRESS REPORT
      10/77 -3RD PROGRESS REPORT
      10/77 -4TH PROGRESS REPORT
      10/78 -5TH PROGRESS REPORT
      10/79 -6TH PROGRESS REPORT
      10/80 -FINAL REPORT
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OUR STUDY ON THE RIVER NILE IN EGYPT ADDRESSES ITSELF TO THE IMPACTS OF THE ASWAN HIGH DAM ON WATER QUALITY IN LAKE NASSER RESERVOIR AND DOWNSTREAM PORTIONS OF THE RIVER. THESE IMPACTS ARE BEING MEASURED IN TERMS OF PHYSICAL, CHEMICAL, AND BIOLOGICAL PARAMETERS. IN HUMAN TERMS, THESE IMPACTS ARE EXAMINED WITH SPECIAL REFERENCE TO AGRICULTURE, PUBLIC HEALTH, AND SOCIO-ECONOMIC EFFECTS. DURING 1975 AND 1976, A COUNTRY-WIDE WATER QUALITY MONITORING NETWORK ALONG THE RIVER NILE AND LAKE NASSER WAS ESTABLISHED. THIS IS SUPPLEMENTED BY FUNCTIONAL STUDIES WHICH INTEGRATE ACROSS THE DISCRETE GEOGRAPHIC BOUNDARIES OF THE SYSTEM AND INCLUDE STUDIES OF PLANKTON, BENTHOS, HYDROPHYTES, AND FISHERIES. THE GATHERED INFORMATION IS BEING FED TO AN ENVIRONMENTAL INFORMATION STORAGE AND RETRIEVAL SYSTEM. PUBLIC HEALTH IMPACTS STUDIES HAVE BEEN SOLELY CONCERNED WITH THE EFFECTS OF CHANGES IN WATER RESOURCES IN RURAL EGYPT. AGRICULTURAL IMPACTS STUDIES ARE BASED ON LABORATORY AND FIELD ASSESSMENT OF THE EFFECTS OF LACK OF SILT, WATERLOGGING, AND SALINIZATION ON SOIL FERTILITY AND AGRICULTURAL PRODUCTION. SOCIO-ECONOMIC IMPACTS STUDIES ARE CONCERNED WITH THE ASSESSMENT OF ALTERNATIVE STRATEGIES IN A POLICY CONTEXT USEFUL TO THE DECISION MAKER.

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DEVELOPMENT OF METHODS FOR THE DETECTION AND INACTIVATION OF VIRUSES IN
VARIOUS WATERS
   START/ COMPL DATE :    02/75 - 05/78 : FUNDING : EST. - FY   77  / $   60000
    TASK/EPA CODE :A713C-32     / R803510-03  (GRANT)  PRIOR  FY76 / $   590001
   PROJECT OFFICER : G    BERG
   INVESTIGATORS :    H I SHUVAL                        HEBREW UNIVERSITY OF JERUSALE
                      E   KATZENELSON·                  HEBREW UNIVERSITY OF JERUSALE
   MILE: 05/78 -REPORT
     THE OVERALL OBJECTIVES OF THIS PROJECT ARE, A. TO FURTHER DEVELOP AND
     REFINE EFFICIENT RAPID AND INEXPENSIVE MONITORING METHODS FOR THE DETECT
     ION AND QUANTITATIVE ASSAY OF LOW LEVELS OF VIRUSES IN LARGE VOLUMES OF WA
     TER AND WASTEWATER, AND TO EVALUATE VARIOUS PROMISING VIRUS MONITORING AND
      DETECTION METHODS BY STANDARDIZED AND CONTROLLED PROCEDURES. B. TO D
     EVELOP EFFECTIVE AND ECONOMICAL PROCEDURES FOR THE INACTIVATION OF ENTERIC
     VIRUSES IN WASTEWATER, RENOVATED WATER AND OTHER FORMS OF POLLUTED WATER
      BY OZONE AND TO ESTABLISH RELIABLE METHODS FOR THE CONTROL AND EVALUATION
      OF THE PROCESS.
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II-50

MATRIX-ISOLATION STUDIES INVOLVING THE OXIDATION OF SULFUR DIOXIDE

START/ COMPL DATE : 07/75 - 12/77 : FUNDING : EST. - FY 77 / $ 25000
TASK/EPA CODE :G603A-AE-07 / R803516-02 (GRANT) PRIOR FY76 / $ 300001
PROJECT OFFICER : J J BUFALINI
INVESTIGATORS : C E HUNTER HAMPTON INSTITUTE
MILE: 11/77 -REPORT ON SO2 OXIDATION

IT IS PROPOSED TO STUDY THE OXIDATION OF SULFUR DIOXIDE IN THE ATMOSPHERE USING THE TECHNIQUES OF MATRIX-ISOLATION AND MOLECULAR FRAGMENTATION. REACTIONS OF OLEFINS AND OZONE AND THE SUBSEQUENT OXIDATION OF SO2 WILL BE MONITORED WITH A MODEL 12-A FOURIER TRANSFORM INTERFEROMETER. SPECTRA OF MIXTURE OF ETHYLENE AND OZONE SUGGEST THE FORMATION OF AT LEAST TWO REACTION INTERMEDIATES. ARGON DILUTED SAMPLES OF SULFUR DIOXIDE AND ISOTOPIC OZONE REVEALED APPRECIABLE 18OXYGEN EXCHANGE ONLY AFTER THE SAMPLE WAS ALLOWED TO STAND FOR TWO DAYS. DETECTION OF THE REACTIVE SPECIES PROVIDES THE KINETIC AND STRUCTURAL DATA NECESSARY TO ELUCIDATE THE OXIDATIVE MECHANISM OF SO2 AND OTHER POLLUTANTS SUCH AS NITROGEN OXIDES AND VINYL CHLORIDES.

The primary objective of this project is to evaluate the effectiveness and economic impacts of alternatives for controlling the loss of sediment, nutrients, and other pollutants from irrigated areas. Field work will be conducted in two irrigated areas in southern Idaho to (1) quantify the effect of tillage, irrigation and management practices on the quantity and quality of return flow from irrigated areas and (2) evaluate the effectiveness of settling ponds, vegetated strips, and other devices in removing sediment and other materials from the surface runoff from irrigated fields. Selected fields and pollutant removal systems will be instrumented so that all inflows and outflows can be continuously monitored. Flow samples will be collected at regular intervals and analyzed for sediment, nitrogen, phosphorous, and other constituents. Water, sediment, and nutrient balances will be established for each field site.

Enterprise and farm budgets will be developed to determine the costs and returns for the alternatives considered relative to their effectiveness in controlling surface runoff and pollutant losses. The aggregate effects of reducing the loss of sediment and other pollutants from irrigated areas will also be determined.

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COMBINED MEMBRANE AND FREEZING CONCENTRATION BLEACHING WATERS

   START/ COMPL DATE :    08/76 - 11/77 : FUNDING : EST. - FY   77  / $   24000
    TASK/EPA CODE :B6108-054    / R803525-04  (GRANT)  PRIOR  FY76 / $   160001
   PROJECT OFFICER : R H  SCOTT
   INVESTIGATORS :   D   EASTY                    INST. OF PAPER CHEMISTRY
   MILE: 08/76 -FUNDING PACKAGES SUBMITTED
         09/76 -AWARD FUNDS FOR PROJECT
         08/77 -DRAFT FINAL REPORT
         11/77 -FINAL REPORT RECEIVED
     THE OBJECTIVE OF THIS RESEARCH PROJECT WAS TO DETERMINE THE PRESENCE OF
     TOXIC RESIN ACIDS, UNSATURATED FATTY ACIDS AND CHLORINATED COMPO
     UNDS IN PULPING AND BLEACHING WASTES AND TO DETERMINE THEIR DESTRUCTION OR
     CONTROL BY SECONDARY TREATMENT OR TERTIARY PROCESSES. A TOTAL OF 15 PULP
     AND PAPER MILLS IN THE U.S. PARTICIPATED IN SUPPLYING SAMPLES FOR
     ANALYSES BY GC-MS THROUGH THE INSTITUTE. SAMPLES FROM SECONDARY
     TREATMENT, MEMBRANE PROCESSES AND ALUM TREATMENT ARE TO BE ANALYZED FOR TO
     XICS CONTROL OR REDUCTION. A FINAL REPORT OF FINDINGS WILL BE PUBLISHED IN
     THE EPA TECHNOLOGY SERIES FOR DISTRIBUTION TO INDUSTRY, FEDERAL AND STATE
      AGENCIES AND OTHERS.
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DESIGN OF STACK SAMPLING SYSTEM WITH DILUTION

   START/ COMPL DATE :    03/75 - 03/78 : FUNDING : EST. - FY   77  / $   25000
    TASK/EPA CODE :G712B-BD-16  / R803560-03  (GRANT)  PRIOR  FY76 / $   500001
   PROJECT OFFICER : K    KNAPP
   INVESTIGATORS :    R J HEINSOHN                        PENN. STATE UNIVERSITY
                      J W DAVIS                           PENN. STATE UNIVERSITY
   MILE: 06/77 -FINAL REPORT
     THE SPECIFIC OBJECTIVE OF THE PROPOSAL IS TO DESIGN, DEVELOP AND TEST A
     STACK SAMPLING SYSTEM IN WHICH THE SAMPLE IS DILUTED WITH AIR IN ORDER
     TO SIMULATE SOURCE EMISSIONS AT AMBIENT CONDITIONS. THE PERFORMANCE OF
     THE SYSTEM WILL BE COMPARED DIRECTLY TO THE PERFORMANCE OF A TYPICAL
      CONVENTIONAL SYSTEM. DIRECT COMPARISON TESTS WILL BE CONDUCTED TO DE
     TERMINE THE EFFECT OF DILUTION ON: (A) MASS OF THE PARTICULATE MATTER; (B)
      SIZE DISTRIBUTION OF THE PARTICULATE MATTER; (C) CHEMICAL
     COMPOSITION OF THE PARTICULATE MATTER.
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GENETIC AND CELLULAR EFFECTS OF MICROWAVE RADIATION

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START/ COMPL DATE :    06/75 - 06/78 : FUNDING : EST. - FY   77  / $   30000
 TASK/EPA CODE :H628A-7413   / R803561-02  (GRANT)  PRIOR  FY76 / $   200001
PROJECT OFFICER : C F  BLACKMAN
INVESTIGATORS :   S K DUTTA                     HOWARD UNIVERSITY
                  D   BRUSICK                   LITTON BIONETICS INCORPORATED
                  C   BLACKMAN                  U.S. ENVIRON. PROTECTION AGCY
MILE: 05/76 -ANNUAL REPORT
      05/77 -ANNUAL REPORT
      05/78 -ANNUAL REPORT
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OBJECTIVE: TO DETERMINE WHETHER MICROWAVE RADIATION CAN AFFECT NORMAL CELLULAR PROCESSES ASSOCIATED WITH THE UTILIZATION OF GENETIC INFORMATION. APPROACH: A BATTERY OF CELLULAR SYSTEMS HAVING A VARIETY OF GENETIC STRUCTURES AND FUNCTIONS, WILL BE USED TO DISTINGUISH BETWEEN PERTURBATIONS CAUSED SOLELY BY TEMPERATURE RISE AND THOSE CAUSED BY OTHER MECHANISMS.PROGRESS: SEVERAL GENETIC SYSTEMS HAVE BEEN ESTABLISHED, STANDARDIZED, AND CHARACTERIZED OVER A RANGE OF ENVIRONMENTAL TEMPERATURES. THESE INCLUDE STRAINS OF SACCHAROMYCES CEREVISIAE, SALMONELLA TYPHIMURIUM, AND ESCHERICHIA COLI. THESE CELL TYPES HAVE BEEN EXPOSED TO PULSED RADIATION BETWEEN 8.6 AND 9.6 GHZ, AND THE DATA IS CURRENTLY BEING ANALYZED.

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POTENTIAL IMPACTS TO GROUND-WATER & SURFACE-WATER QUALITY & QUANTITY
FROM PROPOSED ENERGY DEVELOPMENT ON THE NORTHERN CHEYENNE RES
   START/ COMPL DATE :    06/75 - 09/78 : FUNDING : EST, - FY   77  / $  177000
    TASK/EPA CODE :B6238-356     / R803566-03  (GRANT)  PRIOR  FY76 / $  4770001
   PROJECT OFFICER : J F  MARTIN
   INVESTIGATORS :    R   MONTEAU                     NORTHERN CHEYENNE TRIBE
                      W W WOESSNER                    NORTHERN CHEYENNE TRIBE
                      E   HEFFERN                     NORTHERN CHEYENNE TRIBE
   MILE: 05/75 -FUNDING PACKAGE SUBMITTED
         06/75 -AWARD FUNDS FOR PROJECT
         04/76 -FUNDING INCREMENT
         03/77 -FUNDING INCREMENT
         09/78 -FINAL REPORT RECEIVED
     THE NORTHERN CHEYENNE TRIBE, VIA THE NORTHERN CHEYENNE RESEARCH PROJECT,
     DESIRES TO DEVELOP AN IN-DEPTH KNOWLEDGE OF THE CHEMICAL AND PHYSICAL
      CHARACTER OF THE RESERVATION WATER RESOURCES, AND THE INTERRELATION OF
     WATER TO OTHER RESOURCES, SO THAT THE TRIBE CAN MAKE FORMAL CHOICES IN
      PLANNING COAL DEVELOPMENT. A THREE-YEAR STUDY PLAN HAS BEGUN TO: (1)
     GATHER AND INTERPRET BASELINE DATA CONCERNING THE WATER RESOURCES AND THE
      INTERRELATIONSHIPS OF THESE DATA TO LAND, BIOCOMMUNITY, SUPPLY NEEDS, AND
      ENERGY RESOURCES OF THE RESERVATION; (2) ASCERTAIN POTENTIAL ADVERSE
     CHEMICAL, PHYSICAL, AND ECONOMIC IMPACTS TO RESERVATION WATER RESOURCES
     FROM COAL DEVELOPMENT; AND (3) DEVELOP A COMPREHENSIVE WATER RESOURCES
      MANAGEMENT PLAN THAT WILL AID PRESENT AND FUTURE PLANNING FOR RESOURCES
      EXPLOITATION. STANDARD FIELD AND LABORATORY METHODOLOGY ARE BEING
     EMPLOYED IN ASSESSING THE GEOLOGY, SURFACE WATER, AND GROUND WATER OF R
     ESERVATION LANDS. BASELINE DISCHARGE AND WATER QUALITY DATA COLLECTION HAS
     BEGUN FOR SIX RESERVATION STREAMS. WELL INVENTORIES, A BASIC GROUND
     WATER MONITORING PROGRAM, AND COLLECTION OF GROUND WATER QUALITY DATA HAS
     BEGUN. STRATIGRAPHIC CORRELATION OF THE REGIONAL AND LOCAL
     GEOLOGY IS COMPLETED AND POTENTIAL DEVELOPMENT PRIORITY AREAS HAVE BEEN
     SELECTED. DURING THE THIRD BUDGET PERIOD A DESCRIPTION OF POTENTIAL IMPAC
     TS TO THE SURFACE AND GROUND WATER RESOURCES FROM MINING AND A RESERVATION
      WATER RESOURCES MANAGEMENT PLAN WILL BE PREPARED.
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The objective of the project is to build a true monitor instrument capable of recording the mass distribution of aerosols in the laboratory and in the field. Time constants will range from minutes or less for source emissions to several hours for unpolluted air (background aerosol). A subordinate objective is to facilitate size-selective sampling of particulate matter of very low airborne concentration for subsequent physical and chemical analysis. The design makes use of the concept of the Stöber spiral duct centrifuge for aerosols and incorporates a number of quartz oscillators as size-selective mass sensors along the duct. Current plans anticipate a prototype instrument for continuous sampling and telemetric mass distribution data acquisition in the size range between 0,3 and 5 μm diameter. Preceding studies have shown that the size range can be extended (0,08 to 10 μm) and that the concept of the quartz oscillator as a sensitive piezo-electric microbalance has considerably less restrictions when applied in a spinning spiral duct centrifuge than under normal gravity conditions without size selection.

CONFERENCE ON INTERNATIONAL AIR QUALITY MEASUREMENTS

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   START/ COMPL DATE :    02/74 - 02/78 : FUNDING : EST. - FY   77  / $    5000
    TASK/EPA CODE :E621A-20     / R803593-03  (GRANT)  PRIOR  FY76 / $   100001
   PROJECT OFFICER : J B  CLEMENTS
   INVESTIGATORS :   B T LEVODIE                     AMER. SOC. FOR TESTING & MAT.
   MILE: 03/75 -REPORT OF FIRST YEAR ACTIVITIES
         03/76 -REPORT OF SECOND YEAR ACTIVITIES
         03/77 -REPORT OF THIRD YEAR ACTIVITIES
     THE OBJECTIVE IS TO PROVIDE PARTIAL SUPPORT TO THE AMERICAN DELEGATION TO
     INTERNATIONAL STANDARDS ORGANIZATION TECHNICAL COMMITTEE 146 (AIR
     QUALITY) (ISO TC/146). ISO TC/146 IS CONCERNED WITH DEVELOPING INTE
     RNATIONAL STANDARD METHODS FOR AIR POLLUTION AND THIS PROJECT HAS PROVIDED
     TRAVEL FUNDS FOR SEVERAL AMERICAN EXPERTS TO ATTEND INTERNATIONAL MEETINGS
     OF ISO TC/146 HELD IN EUROPE.
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PROCESS AUTOMATION EVALUATION

   START/ COMPL DATE :    05/75 - 05/80 : FUNDING : EST. - FY   77  / $   89554
    TASK/EPA CODE :C611B-7113   / S803602     (GRANT)  PRIOR  FY76 / $  1469161
   PROJECT OFFICER : J F  ROESLER
   INVESTIGATORS :   R C POLTA                          METROP. WASTE CONTROL COMM.
                     D A STULC                          METROP. WASTE CONTROL COMM.
                     R E RICE                           METROP. WASTE CONTROL COMM.
   MILE: 05/75 -START DATE
         06/76 -INTERMEDIATE FUNDING
         07/76 -REPORT ON PLANT STATION
         04/77 -REPORT ON SLUDGE THICKENING
         06/77 -INTERMEDIATE FUNDING
         01/79 -REPORT ON ANAEROBIC DIGESTION
         01/79 -REPORT ON VACUUM FILTRATION
    THE PROJECT OBJECTIVES ARE TO DEVELOP AND DEMONSTRATE AUTOMATED CONTROL
    SCHEMES FOR SLUDGE HANDLING PROCESSES USED AT WASTEWATER TREATMENT PLANTS
    AND COMPARE THEIR PERFORMANCE AND COST EFFECTIVENESS WITH CONVENTIONAL C
    ONTROL METHODS. SPECIFIC OBJECTIVES FOR THE YEAR 6/22/77 TO 6/21/78 ARE AS
     FOLLOWS: (1) COMPLETE EVALUATION OF THICKENER UNDERFLOW PUMPING CO
    NTROL SCHEME AND PREPARE PROJECT REPORT. (2) DEMONSTRATE AUTOMATED CONTROL
    OF A VACUUM FILTER. INITIALLY CONTROL LOOPS THAT DO NOT INTERACT WILL BE
    INSTITUTED SUCH AS VAT LEVEL CONTROL, VACUUM CONTROL AND PH CONTROL OF
    BOTH THE FERRIC CHLORIDE AND LIME CONDITIONED SLUDGE. LATER DURING THE
    YEAR SEVERAL INTEGRATED CONTROL SCHEMES WILL BE INITIATED TO CONTROL
    CAKE MOISTURE CONTENT AND DRY SOLIDS PRODUCTION RATE. A MINI COMPUTER SY
    STEM IS CURRENTLY BEING CONSTRUCTED TO MONITOR SYSTEM PERFORMANCE AND TAKE
    CONTROL ACTION AS REQUIRED. (3) DESIGN AND IMPLEMENT AN INTEGRATED
    CONTROL SYSTEM FOR THE MULTIPLE HEARTH INCINERATOR USED TO BURN THE CAKE
    PRODUCED IN (2) ABOVE. ALL WORK WILL BE CARRIED OUT AT TREATMENT FACILITI
    ES CURRENTLY OPERATING AND UNDER THE CONSTRAINT THAT NO ADVERSE EFFECTS ON
    EFFLUENT QUALITY ARE ALLOWABLE.
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803603

II-59

This project proposes to (a) collate and evaluate available information and data on irrigation tailwater production, its quality and reuse potentials, (b) carry out field studies to develop data not now available regarding tailwater flow and salinity and suspended matter in the Sacramento and San Joaquin Valleys of California, (c) determine least cost combination of agricultural production and labor, capital, irrigation water, and tailwater management, and (d) integrate scientific, engineering, and economic appraisals to recommend the best practicable technology for irrigation tailwater management.

II-60

CLADOPHORA MEASUREMENTS USING REMOTE SENSING

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START/ COMPL DATE :    01/75 - 11/77 : FUNDING : EST. - FY   77  / $    3980
 TASK/EPA CODE :N608A-019     / R803611      (GRANT)  PRIOR  FY76 / $   527511
PROJECT OFFICER : M D  MULLIN
INVESTIGATORS :   C T WEZERNAK                        ENVIRONMENTAL RES. INST. MICH
MILE: 01/78 -FINAL REPORT DUE
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THE OBJECTIVES OF THE PROJECT ARE TO DEVELOP AND/OR DEMONSTRATE REMOTE SENSING TECHNIQUES FOR MAPPING CLADOPHORA USING PASSIVE MULTISPECTRAL SCANNER DATA COLLECTED FROM LOW AIRCRAFT ALTITUDES, AND TO DEFINE THE CAPABILITY OF PASSIVE MULTISPECTRAL REMOTE SENSING FOR ESTIMATING CLADOPHORA BIOMASS. REMOTE SENSING AND SUPPORTING FIELD DATA WILL BE COLLECTED DURING JUNE 1975 OVER A 5 KM STUDY AREA ALONG THE SHORELINE OF LAKE ONTARIO AT A LOCATION NEAR ROCHESTER, NEW YORK. PROCESSING OF MULTISPECTRAL SCANNER DATA WILL INCLUDE BOTH ANALOG AND DIGITAL TECHNIQUES TO SHOW THE DISTRIBUTION OF CLADOPHORA AND TO RELATE SPECTRAL CHARACTERISTICS TO STANDING CROP.

NITROGEN AND PHOSPHORUS REACTIONS IN OVERLAND FLOW OF WASTEWATER

START/ COMPL DATE : 08/77 - 08/78 : FUNDING : EST. - FY 77 / $ 58899
TASK/EPA CODE :L611C-49 / R803612-02 (GRANT) PRIOR FY76 / $ 876501
PROJECT OFFICER : B E BLEDSOE
INVESTIGATORS : W H PATRICK LOUISIANA STATE UNIV. SYSTEMS
R A KHALID LOUISIANA STATE UNIV. SYSTEMS
MILE: 10/78 -FINAL PROJECT REPORT

THE OBJECTIVES OF THIS PROPOSAL ARE TO FIND OUT HOW RAPIDLY, HOW COMPLETELY, AND BY WHAT MECHANISM NITROGEN IN WASTEWATER IS CONVERTED TO ATMOSPHERIC NITROGEN AND NITROUS OXIDE DURING OVERLAND FLOW OVER GRASSED SOIL SURFACES, AND TO DETERMINE THE MECHANISMS BY WHICH ORTHOPHOSPHATE IS REMOVED FROM WASTEWATER DURING OVERLAND FLOW. THE APPROACH TO BE USED TO STUDY NITROGEN BEHAVIOR IS TO EMPLOY SMALL-SCALE COMPLETELY ENCLOSED SYSTEMS CONSTRUCTED FROM PLEXIGLAS THAT CONTAIN THE SOIL-PLANT-ATMOSPHERE SYSTEM AND TO ADD N-15 LABELLED AMMONIUM TO THE OVERLAND FLOW WATER AND TRACE ITS REACTIONS USING AN ISOTOPE-RATIO MASS SPECTROMETER. PHOSPHATE SORPTION UNDER AEROBIC AND ANAEROBIC CONDITIONS WILL BE EVALUATED BY MEANS OF THE LANGMUIR EQUATION. THE KINETICS OF PHOSPHATE SORPTION WILL ALSO BE DETERMINED FOR THE TWO AERATION CONDITIONS. RESULTS TO DATE SHOW THAT LABELLED NITROGEN DOES UNDERGO SEQUENTIAL NITRIFICATION-DENITRIFICATION REACTIONS THAT CONVERTS AMMONIUM TO NITRATE AND THEN TO NITROGEN GAS DURING OVERLAND FLOW.

IV-62

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ORGANIC N-CHLORO COMPOUNDS IN CHLORINATION OF WATER SUPPLIES

    START/ COMPL DATE :    02/75 - 12/77 : FUNDING : EST. - FY   77  / $   14000
     TASK/EPA CODE :C614A-7190    / R803631      (GRANT)  PRIOR  FY76 / $   529151
    PROJECT OFFICER : E    KATZ
    INVESTIGATORS :   J C MORRIS                    HARVARD UNIVERSITY
    MILE: 04/76 -ELUCIDATION OF CHLORINE RX WITH ORGANIC NITROGENOUS CMPS
          08/76 -ELUCIDATION OF HALOFORM PRODUCTION IN THESE REACTIONS
          01/77 -RATE STUDIES
          05/77 -INITIAL PROGRESS IN IDENTITY AND ISOLATION OF CMPS IN WATER SUP
      FORMATION OF N-CHLORO COMPOUNDS BY THE REACTION OF AQUEOUS CHLORINE WITH
      NITROGENOUS ORGANIC MATERIAL IN WATER SUPPLIES IS BEING INVESTIGATE
      D. THE OBJECT IS TO ASSESS AND DETERMINE THE EFFECTS THE FORMATION OF SUCH
       COMPOUNDS MAY HAVE ON ANALYTICAL DETERMINATIONS OF FREE AND COMBINED
      CHLORINE IN TREATED WATERS AND RELATIONS OF THEIR FORMATION TO THE DI
      SINFECTING PROCESS ITSELF. TWO APPROACHES ARE BEING USED: (1) REACTIONS OF
       SINGLE ORGANIC COMPOUNDS THOUGHT LIKELY TO BE PRESENT IN SURFACE WATERS
      , INCLUDING PYRIMIDINES, PURINES AND PYRROLIC COMPOUNDS, ARE BEING STUDIED
       INDIVIDUALLY; (2) SEPARATION AND IDENTIFICATION OF NITROGENOUS
      ORGANIC COMPOUNDS FROM TYPICAL SURFACE WATERS IS BEING ATTEMPTED. THE
      MOST INTERESTING FINDING TO DATE IS THAT CYTOSINE REACTS TO FORM A MONO
      N-CHLORO DERIVATIVE WITH REACTIVITY LIKE THAT OF DICHLORAMINE, NHCL2, AND
      AN N,N-DICHLOR DERIVATIVE WITH REACTIVITY LIKE THAT OF
      MONOCHLORAMINE, NH2CL.
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803634

II-62.A

It is the objective of this project to develop a strategy of insect control in which a complex of closely-related species (apple pests) is controlled with a defined mixture of pheromone components. A number of species, e.g. the redbanded, obliquebanded, threelined and fruittrees leafroller moths, use the same pheromone components but in different ratios and with the addition of other components. Tests will be conducted to define the effect on pheromone trap orientation by permeating the air with each component alone and then in certain mixtures. The best disruptant will be used in pilot studies in which flight orientation and mating efficiency are monitored. If positive results are obtained, the method will be used in a pest management project now underway in New York apple orchards. Pheromone components will be emitted from hollow fibers.

FIELD STUDY OF NUTRIENT CONTROL IN A MULTI-CELL LAGOON

START/ COMPL DATE : 06/75 - 12/78 : FUNDING : EST. - FY 77 / $ 50330
TASK/EPA CODE :C611B-7055 / R803637 (GRANT) PRIOR FY75 / $ 1068221
PROJECT OFFICER : E J OPATKEN
INVESTIGATORS : W ENGEL CHARLES CO. COMMUNITY COLLEGE
MILE: 07/75 -GRANT AWARD - START OF BASELINE DATA
08/76 -START OF PHOSPHORUS CONTROL, COMPLETE BASELINE DATA
08/77 -START OF AMMONIA CONVERSION TO NITRATE
08/77 -RELOCATE ALUM ADDITION FROM CELL #3 TO CELL #1

THE PRINCIPAL OBJECTIVE OF THIS PROJECT IS THE DEVELOPMENT OF RELIABLE TECHNIQUES CONSISTENT WITH THE BASIC SIMPLICITY OF LAGOON OPERATION FOR REMOVING PHOSPHORUS AND UNOXIDIZED NITROGEN FROM LAGOON EFFLUENTS. TWO IN-CELL INJECTION POINTS WILL BE EVALUATED TO DETERMINE THE POTENTIAL OF ALUM ADDITION FOR EFFICIENTLY REMOVING PHOSPHORUS FROM WASTEWATER BEING PROCESSED IN A THREE-CELL COMBINED AERATED/FACULTATIVE LAGOON. A SIDESTREAM OF EFFLUENT FROM THE LAST CELL OF THIS TEST LAGOON WILL BE DIVERTED THROUGH A PLASTIC-MEDIA TRICKLING FILTER TOWER TO EVALUATE THE POTENTIAL FOR ACHIEVING NITRIFICATION WITH THIS TYPE OF SECOND STAGE BIOLOGICAL TREATMENT. THE SECONDARY OBJECTIVE IS THE ACQUISITION OF RELIABLE LONG-TERM DATA FROM WELL DESIGNED AND WELL OPERATED THREE-CELL COMBINED AERATED/FACULTATIVE LAGOON NOT RECEIVING ALUM ADDITION WHICH WILL BE OPERATED IN PARALLEL WITH THE TEST SYSTEM AND SERVE AS A CONTROL. ASSESSMENT OF THE EFFECT OF ALUM ADDITION, NOT ONLY ON PHOSPHORUS REMOVAL, BUT ALSO ON SUSPENDED SOLIDS AND ORGANIC REMOVALS, AND DETERMINATION OF ADDITIONAL COST AND OPERATING REQUIREMENTS NECESSITATED BY THE NUTRIENT CONTROL PROCEDURES ARE ADDITIONAL OBJECTIVES.

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DETERMINE HEALTH EFFECTS DATA AND PREPARE CRITERIA DOCUMENT RECOMMENDING
 DRINKING WATER STANDARD FOR MOLYBDENUM
   START/ COMPL DATE :    04/75 - 07/75 : FUNDING : EST. - FY   77  / $  159000
    TASK/EPA CODE :D614B-056    / R803645-03  (GRANT)  PRIOR  FY76 / $  1988061
   PROJECT OFFICER : P    HEFFERNAN
   INVESTIGATORS :   W R CHAPPELL                    UNIV. OF COLORADO
                     W R CHAPPELL                    SCIENCE APPLICATIONS INC.
                     C   SOLOMONS                    UNIV. OF COLORADO
                     P   WALRAVENS                   UNIV. OF COLORADO
                     P   WINSTON                     UNIV. OF COLORADO
                     R   MOORE                       UNIV. OF COLORADO
   MILE: 06/75 -SYMPOSIUM ON MO IN ENVIRONMENT
         04/76 -MO CONTENT IN BLOOD & TISSUE OF VOLUNTEERS
         10/76 -BEGIN BIOAVAILABILITY OF MO, COMPLETE RAT STRESS STUDIES
         04/77 -BEGIN CLINICAL BALANCE STUDIES
         10/77 -FINAL REPORT ON LAB ANIMALS STUDIES
         04/78 -COMPLETE DRAFT OF CRITERIA DOCUMENT
         07/78 -CRITERIA DOCUMENT COMPLETE
     MOLYBDENUM IS AN ELEMENT WHICH IS A MICRONUTRIENT FOR PLANTS IN THAT IT
     PLAYS A CRUCIAL ROLE IN SOME FLAVOENZYMES. AT SUFFICIENTLY HIGH RATES OF
     INTAKE MO IS TOXIC TO ORGANISMS; RUMINANTS ARE MUCH MORE SENSITIVE THAN
     NONRUMINANTS. THE ROCKY MOUNTAIN STATES PRODUCE ESSENTIALLY ALL THE U.S.
      MOLYBDENUM. MUCH OF THIS PRODUCT IS PROCESSED AND USED IN EASTERN
     U.S. THE OCCURRENCE OF SIGNIFICANTLY ELEVATED LEVELS OF MO IN DR
     INKING WATER DUE TO INDUSTRIAL SOURCES HAS BEEN DOCUMENTED AND STORET DATA
     INDICATES THAT THIS OCCURRENCE IS NOT CONFINED TO THE ROCKY MOUNTAIN
     REGION. THE OBJECTIVES OF THIS RESEARCH ARE TO CONTINUE TO DETERMINE THE H
     EALTH EFFECTS OF EXPOSURE TO MO IN DRINKING WATER, FOOD, AND AS RESPIRABLE
      DUST IN INDUSTRIAL PROCESSING PLANTS, AND TO PREPARE A CRITERIA DOC
     UMENT RECOMMENDING STANDARDS FOR DRINKING WATER. SPECIFICALLY, THE PROGRAM
     IS IN THE PROCESS OF DETERMINING THE AVERAGE INTAKE OF MO IN THE TOTAL
     HUMAN DIET. RANGES SET FROM PREVIOUS RESEARCH ARE BEING USED TO
     ESTABLISH THE MOST USEFUL SAMPLING AREAS. LABORATORY WORK ON RATS IS BEING
     DONE TO DETERMINE RELATIVE ABSORPTION OF MO IN FOOD AND WATER, AND THUS
     ASCERTAIN RELATIONSHIPS BETWEEN TISSUE LEVELS OF MO AND PHYSIOLOG
     ICAL EFFECTS. METHODS ARE BEING DEVELOPED TO ESTABLISH A CONSTANT THAT CAN
     BE USED TO TRANSPOSE EXPERIMENTAL RESULTS OF METABOLISM OF MO IN RATS TO
     THAT OF HUMANS. LEVELS OF RESPIRABLE DUST EXPOSURE OF WORKERS IN MO P
     ROCESSING MILLS ARE BEING DETERMINED BY STUDYING CONCENTRATIONS IN VARIOUS
     AREAS OF MO PLANTS. PREDICTIONS OF DEPOSITION AND RETENTION OF INHALATION
     EXPOSURE ARE PROJECTED. ANALYSES OF METABOLIC DATA ON PLATELETS AND RED
     BLOOD CELLS FROM CONTROLS AND INDIVIDUALS EXPOSED TO MO IN DIET AND IN
     INDUSTRIAL MILLS ARE BEING CONDUCTED TO DETERMINE BIOCHEMICAL CHANGES.
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IDENTIFICATION AND QUANTIFICATION OF NONVOLATILE ORGANIC SUBSTANCES IN MUNICIPAL DRINKING WATER SUPPLIES

START/ COMPL DATE : 06/76 - 06/78 : FUNDING : EST. - FY 77 / $ 11916
TASK/EPA CODE :D614B-048 / R803650-01 (GRANT) PRIOR FY76 / $ 123301
PROJECT OFFICER : W E COLEMAN
INVESTIGATORS : A W SMALLEY SOUTHERN UNIV. A & M COLLEGE
M M FONTENOT SOUTHERN UNIV. A & M COLLEGE

MILE: 09/76 -QUARTERLY REPORT, SOLUBILITY STUDY INITIATED AND COMPLETED
01/77 -QUARTERLY REPORT, LIQUID CHROMATOGRAPH DELIVERED AND INSTALLED
01/77 -REVERSE OSMOSIS (RO) RESIDUE SAMPLE ANALYZED
03/77 -QUARTERLY REPORT, A CINCINNATI RO WATER SAMPLE WAS SENT FOR MET
06/77 -YEARLY REPORT, ANALYSIS OF CINCINNATI RO SAMPLE IN PROGRESS
06/78 -FINAL REPORT DUE SHOWING METHODOLOGY FOR CHARACTERIZING NONVOLA

THE MAIN OBJECTIVE OF THIS PROJECT IS TO DEVELOP METHODOLOGY TO ANALYZE WATER SAMPLES FOR THE NONVOLATILE ORGANIC COMPONENTS, NAMELY, THOSE COMPONENTS THAT ARE NOT AMENABLE TO GAS CHROMATOGRAPHY. THE LIQUID CHROMATOGRAPH SYSTEM, WITH THE UV-REFRACTOMETER DETECTOR, WILL BE USED TO ANALYZE RESIDUE SAMPLES RESULTING FROM REVERSE OSMOSIS CONCENTRATES. WATER SUPPLY SAMPLES FROM THE BATON ROUGE SYSTEMS WILL BE ANALYZED FOR THEIR NONVOLATILE ORGANIC CONTENT. IN THE INTERM OF WAITING FOR THE LIQUID CHROMATOGRAPH TO BE DELIVERED AND INSTALLED, BATON ROUGE WATER WAS ANALYZED BY GC USING A CARBON ADSORPTION TECHNIQUE. A SOLUBILITY STUDY OF A REVERSE OSMOSIS (RO) CONCENTRATE WAS INITIATED TO FIND SOLVENT SYSTEMS WHICH WOULD EFFECT TOTAL AND PARTIAL DISSOLUTION OF THE RESIDUE. SUCH SYSTEMS WOULD BE DIRECTLY APPLICABLE TO THE SOLVENT SYSTEMS OF THE LIQUID CHROMATOGRAPH. THE LC WAS DELIVERED AND INSTALLED IN JANUARY 1977. AN UPDATED RO SAMPLE OF CINCINNATI WATER WAS COLLECTED FOR ANALYSIS ON THIS SYSTEM IN MARCH 1977. RESULTS OF ANALYSES ARE IN PROGRESS.

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ANALYTICAL SUPPORT (TRACE METAL ANALYSIS) FOR BIOLOGICAL SYSTEMS

  START/ COMPL DATE :    07/77 - 09/77 : FUNDING : EST, - FY   77  / $   12400
   TASK/EPA CODE :H601B-7125   / R803651-20  (GRANT)  PRIOR  FY   /          1
  PROJECT OFFICER : J    SIGSBY
  INVESTIGATORS :    T H RISBY                       UNIV, OF PENNSYLVANIA
  MILE: 10/76 -INITIATE SAMPLE GENERATION AND ANALYZE SAMPLES SENT ON AS-NEEDE
    CHARACTERIZATION OF ULTRA-TRACE SUBSTANCES (E,G, RH, IR, PT, PD, NI, BE)
    FOR MATERIALS CONTEMPLATED FOR USE IN BIOLOGICAL TEST SYSTEMS, MANY SA
    MPLES OF PARTICULATE GENERATED BY THE VARIOUS PROJECTS IN THE AUTOMOTIVE E
    MISSION CHARACTERIZATION PROGRAM ARE OF EXTREMELY SMALL MASS; THIS MASS IS
     SUITABLE FOR IN VITRO BIOASSAY, FOR EXAMPLE, BUT THE SAMPLE SIZE IS
    NOT SUFFICIENT TO APPLY STANDARD ANALYTICAL TECHNIQUES FOR
    COMPONENTS IN MANY CASES, IN ORDER TO PROVIDE ACCURATE CHARACTERIZATION
    DATA ON THESE VERY SMALL SAMPLES, NON-ROUTINE ANALYSIS SUCH AS CHEMICAL
    IONIZATION MASS SPECTROMETRY IS NECESSARY FOR PROPER INTERPRETATION OF
    BIOLOGICAL TEST RESULTS,
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TRUCK WASHING TERMINAL WATER POLLUTION CONTROL

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START/ COMPL DATE :    06/75 - 04/78 : FUNDING : EST. - FY   77  / $   54000
 TASK/EPA CODE :1B610B-049    / S803656-01  (GRANT)  PRIOR  FY76 / $  1900001
PROJECT OFFICER : R J  TURNER
INVESTIGATORS :   J E OBRIEN                    MATLACK INCORPORATED
MILE: 05/75 -FUNDING PACKAGE SUBMITTED
      06/75 -AWARD FUNDS
      06/77 -DRAFT FINAL REPORT
      07/77 -AMENDMENT (CHEMICAL OXIDATION STUDY)
      11/77 -PUBLISH FINAL REPORT
      04/78 -COMPLETE PROJECT
      04/78 -FINAL REPORT RECEIVED
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THIS PROJECT WILL DEMONSTRATE IN FULL-SCALE A PHYSICAL/CHEMICAL/BIOLOGICAL TREATMENT PROCESS FOR THE TREATMENT OF WASTEWATERS GENERATED DURING THE INTERNAL WASHING OF TANK TRUCKS. THE ECONOMICS AND EFFECTIVENESS OF EACH OF THE UNIT PROCESSES TO BE UTILIZED, I.E., SEDIMENTATION, AIR FLOTATION, FILTRATION, CARBON ADSORPTION, AND BIOLOGICAL TREATMENT, WILL BE DETERMINED. THE FEASIBILITY OF REUSING THE TREATED WASTEWATER AND RECLAIMING THE OILY FRACTIONS AS FUEL WILL ALSO BE STUDIED. THE PROJECT WILL ALSO INVESTIGATE THE OCCURRENCE OF TOXIC MATERIALS. A QUALITATIVE AND QUANTITATIVE ASSESSMENT OF OCCURRENCE FROM TANK TRUCK CLEANINGS AND CONTROL USING THE TECHNOLOGY UNDER INVESTIGATION WILL BE UNDERTAKEN.

AEROSOL DYNAMICS

START/ COMPL DATE : 04/75 - 03/78 : FUNDING : EST. - FY 77 / $ 50964
TASK/EPA CODE :G603A-AE-09 / R803660-03 (GRANT) PRIOR FY76 / $ 440001
PROJECT OFFICER : J DURHAM
INVESTIGATORS : J R BROCK UNIV. OF TEXAS
MILE: 09/80 -REPORT ON DEVELOPMENT OF AEROSOL FORMATION AND GROWTH MODEL

OBJECTIVE OF STUDY IS THE CORRELATION OF OBSERVATIONS OF AEROSOL SIZE AND COMPOSITION DISTRIBUTIONS IN THE ATMOSPHERE AND IN SMOG CHAMBERS WITH THE THEORY OF AEROSOL DYNAMICS THROUGH MATHEMATICAL DESCRIPTIONS AND NUMERICAL SIMULATION OF THE BASIC GROWTH PROCESS OF PARTICULATE MATTER. CURRENTLY SIMULATION HAS BEEN ACHIEVED OF URBAN POLLUTANT EPISODE CONDITIONS USING K THEORY FOR PARTICULATE MATTER. WORK IS UNDERWAY TO INCLUDE SIMULATION OF CHEMICAL PROCESSES OCCURRING IN THE ATMOSPHERE.

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APPLICATION AND DEVELOPMENT OF EUTROPHICATION PLANNING MODELS FOR LAKE
ONTARIO
   START/ COMPL DATE :    05/75 - 04/78 : FUNDING : EST, - FY   77  / $  157576
    TASK/EPA CODE :N608A-007     / R803680      (GRANT)  PRIOR  FY76 / $  1273861
   PROJECT OFFICER : W L  RICHARDSON
   INVESTIGATORS :   R V THOMANN                     MANHATTAN COLLEGE
                     J S JERIS                       MANHATTAN COLLEGE
                     D J OCONNOR                     MANHATTAN COLLEGE
                     W F MATYSTIK                    MANHATTAN COLLEGE
                     C   BARTONE                     MANHATTAN COLLEGE
   MILE: 01/78 -COMPLETE LAKE-3 MODEL OF LAKE ONTARIO AND REPORT
         01/76 -COMPLETE DEVELOPMENT PHASE OF ROCHESTER EMBAYMENT MODEL
         03/78 -REFINE ROCHESTER EMBAYMENT MODEL-PHASE II
         03/78 -COMPLETE EUTROPHICATION MODEL FRAMEWORK FOR LAKE MICHIGAN
         03/78 -CONCEPTUALIZE MULTI-SPECIES MODEL FOR LAKE ONTARIO
         01/78 -INITIAL REPORT IN ECO SERIES REPORT
         03/78 -VERIFY AND REFINE LAKE-1 MODEL TO 8 YEARS DATA FOR LAKE ONTARIO
     THE PRIMARY EFFORT TO DATE ON THE MATHEMATICAL MODELING OF EUTROPHICATION
     IN LAKE ONTARIO HAS BEEN DIRECTED TOWARDS SEVERAL AREAS: A) INITIAL
     SENSITIVITY RUNS USING THE LAKE 3 MODEL; B) EXTENSIVE COMPILATION, REDU
     CTION AND PLOTTING OF THE IFYGL DATA BASE; C) COMPLETION OF A VERIFICATION
      ANALYSIS FRAMEWORK FOR THE LAKE 3 MODEL; D) DEVELOPMENT AND PRELI
     MINARY VERIFICATION OF A MODEL OF ROCHESTER EMBAYMENT; E) REDUCTION AND AN
     ALYSIS OF DATA ON PHYTOPLANKTON GROUP FOR A MULTI-SPECIE MODEL. A DETAILED
      AND INTENSIVE INVESTIGATION USING A THREE-DIMENSIONAL REPRESENTATION OF
      PHYTOPLANKTON GROWTH IN LAKE ONTARIO (LAKE 3) IS ONE OF THE OB
     JECTIVES OF THESE EFFORTS. THE LAKE WIDE LAKE 1 MODEL WHICH PREVIOUSLY HAS
     BEEN VERIFIED AND USED FOR LAKE WIDE SIMULATION WILL BE USED TO FURTHER
     DEVELOP THE KINETIC INTERACTIONS. PARTICULAR EMPHASIS WILL BE PLACED ON AN
     ANALYSIS WILL PROVIDE INSIGHT INTO THE EFFECT OF "LONG TERM" MODEL
     COEFFICIENTS (SINKING RATE AND NUTRIENT LOSSES) ON PHYTOPLANKTON DYNAMICS.
     WORK WILL ALSO BEGIN ON A FIRST CONCEPTUALIZATION OF A MODEL OF HAZARDOUS
      SUBSTANCES AND THE INTERACTION OF SUCH A MODEL WITH THE BIOMASS MODELS OF
      LAKE 1 AND LAKE 3.
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EFFECTS OF SO2 AND NOX ON THE SOIL ECOSYSTEM

START/ COMPL DATE : 07/77 - 06/78 : FUNDING : EST. - FY 77 / $ 46000
TASK/EPA CODE :M602A-001 / R803691-03 (GRANT) PRIOR FY76 / $ 901501
PROJECT OFFICER : B LIGHTHART
INVESTIGATORS : M ALEXANDER CORNELL UNIVERSITY
R S WODZINSKI CORNELL UNIVERSITY
D P LABEDA CORNELL UNIVERSITY
MILE: 06/78 -FINAL REPORT

THE INFLUENCE OF CONTINUOUS EXPOSURE TO 5 PPM NO2 ON NITRITE METABOLISM AND NITRIFYING POPULATIONS WILL BE EVALUATED USING SOILS WITH A WIDE RANGE OF PH VALUES. EXPERIMENTS WILL BE CONDUCTED TO ASSESS THE EFFECTS OF CONTINUOUS EXPOSURE OF SOILS TO AN ATMOSPHERE CONTAINING LOW LEVELS OF BOTH SO2 AND NO2 TO DETERMINE IF THERE IS A SYNERGISM. SEVERAL AGRICULTURAL SOILS WILL BE SUBJECTED TO A LONG-TERM EXPOSURE TO 1 PPM SO2 AND POSSIBLY LOW LEVELS OF NO2 TO DETERMINE WHETHER SOLUBILIZATION OF CATIONS TAKES PLACE. THE INFLUENCE OF SO2, NO2, AND THEIR SOLUBILITY PRODUCTS ON AMMONIUM-OXIDIZING AND NITRITE-OXIDIZING AUTOTROPHIC BACTERIA WILL BE EVALUATED. FOR THIS PURPOSE, RESPIROMETRIC TECHNIQUES WILL BE EMPLOYED. ADDITIONAL STUDIES WILL BE PERFORMED TO EVALUATE IN MORE DETAIL THE IMPACT OF BOTH SO2 AND NOX ON THE NITROGEN-FIXING ACTIVITY OF BLUE-GREEN ALGAE INDIGENOUS TO MANY SOILS. SEVERAL NITROGEN-FIXING BACTERIA WILL BE INVESTIGATED TO ESTABLISH WHETHER THESE POLLUTANTS SUPPRESS NITROGEN FIXATION BY HETEROTROPHIC POPULATIONS. FURTHERMORE, THE MECHANISM BY WHICH BISULFITE AND NITRITE INHIBIT BLUE-GREEN ALGAE WILL BE EXPLORED.

II-11

STUDY OF INTERFACE PROBLEMS IN SAMPLING AND MEASUREMENT OF PARTICULATE POLLUTANTS IN HOT STACK GASES

START/ COMPL DATE : 00/77 - 05/79 : FUNDING : EST. - FY 77 / $ 30000
TASK/EPA CODE :G712B-BA-28 / R803692-03 (GRANT) PRIOR FY76 / $ 300001
PROJECT OFFICER : - KNAPP
INVESTIGATORS : D A LUNDGREN STATE UNIVERSITY OF FLA. SYS.
MILE: 10/77 -FINAL REPORT

OBJECTIVES: THE OBJECTIVE OF THIS RESEARCH IS TO STUDY THE INTERFACE PROBLEMS ASSOCIATED WITH EXTRACTIVE SAMPLING AND MEASUREMENT OF PARTICULATE POLLUTANTS IN HOT STACK GASES. APPROACH: A CAREFUL STUDY AND ANALYSIS OF KNOWN OR SUSPECTED PROBLEM AREAS WILL FIRST BE UNDERTAKEN. CERTAIN IMPORTANT PROBLEM AREAS WILL BE SELECTED AND STUDIED EXPERIMENTALLY IN ORDER TO DEFINE AND UNDERSTAND THE CAUSES. SOLUTIONS TO OR WAYS TO MINIMIZE THESE PROBLEMS WILL THEN BE FOUND AND DESCRIBED. PROGRESS: A STUDY OF PROBLEM AREAS HAS BEEN MADE. PARTICULATE SAMPLING ERRORS DUE TO TANGENTIAL FLOW HAVE BEEN EXPERIMENTALLY STUDIED IN THE LABORATORY. A REPORT ENTITLED "ISOKINETIC SAMPLING OF TURBULENT AND TANGENTIAL FLOW STREAMS" HAS BEEN PREPARED AND SUBMITTED TO E.P.A. AN EXPERIMENTAL EVALUATION OF IN-STACK IMPACTORS IS NOW BEING CONDUCTED.

II-72

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NEW POTATO STARCH/PROTEIN PRODUCTION PROCESS

  START/ COMPL DATE :    07/75 - 03/79 : FUNDING : EST. - FY   77  / $   21000
   TASK/EPA CODE :B6108-109    / R803712-03  (GRANT)  PRIOR  FY76 / $   590001
  PROJECT OFFICER : H W  THOMPSON
  INVESTIGATORS :    J R ROSENAU                      UNIV. OF MASSACHUSETTS
                     L F WHITNEY                      UNIV. OF MASSACHUSETTS
  MILE: 07/75 -FUNDING PACKAGE SUBMITTED
        07/75 -AWARD FUNDS
        06/77 -FUNDING INCREMENT
        03/79 -FINAL REPORT RECEIVED
   WORK TO DATE HAS RESULTED IN A PROCESS THAT SEPARATES CULL POTATOES INTO
   STARCH, PULP, AND PROTEIN MEAL. THE PROCESS DOES NOT GENERATE EFFLUENTS
   OF HIGH BOD. OBJECTIVES FOR THE FINAL YEAR INCLUDE GENERATION OF A PLANT
    DESIGN AND COST ANALYSIS AND THE FOLLOWING PROOF-OF-CONCEPT EXPERIMENTS:
   1) DEMONSTRATION THAT PULP DRYING IS NOT IMPAIRED BY CODRYING OF PULP
   AND DEPROTEINATED JUICE. 2) DEMONSTRATION THAT REGENERATION HEATING OF
   JUICE TO PRODUCE PROTEIN COAGULATION DOES NOT PRODUCE EXCESSIVE HEAT E
   XCHANGER FOULING. 3) DETERMINATION OF THE EFFECT OF PROTEIN COAGULATION PH
   (IN THE RANGE OF 4-6) ON THE PROTEIN MEAL SOLANINE CONTENT. 4) CONFIRMAT
   ION THAT RAPID HEAT COAGULATION OF THE PROTEIN PRODUCES A MEAL WITH LYSINE
    AVAILABILITY AND PROTEIN DIGESTABILITY COMPARABLE TO SOY BEAN PROTEIN
   MEAL. THE OBJECTIVES WILL BE ACHIEVED THROUGH PILOT SCALE (ABOUT 1000
   POUNDS OF POTATOES PER RUN) PROCESSING OF CULL POTATOES INTO THE
   VARIOUS OUT MATERIALS.
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EVALUATION OF EXISTING GROUNDWATER BASIN MANAGEMENT MODELS

   START/ COMPL DATE :    00/00 - 00/00 : FUNDING : EST. - FY   77  / $   10750
    TASK/EPA CODE :1L609B-62     / R803713-01  (GRANT)  PRIOR  FY75 / $   750561
   PROJECT OFFICER : J W  KEELEY
   INVESTIGATORS :   F   FRENKIEL                     SCIENTIFIC COMM. ON PROB. ENV
                     F   FRENKIEL                     U.S. NAVY
                     R E MUNN                         ATMOSPHERIC ENVIRON. SERVICE
   MILE: 12/77 -GLOBAL GROUNDWATER MODELS EVALUATION
     GROUNDWATER BASIN MANAGEMENT ESSENTIALLY MUST RELY ON FOUR ASPECTS OF
     MODELING WHICH COMBINE TO DESCRIBE THE SUBSURFACE SYSTEM NATURALLY AND AS
      IT RESPONDS TO STRESSES IMPOSED BY MANAGEMENT. THE FIRST WILL ALLOW THE
     PREDICTION OF CHANGES IN GROUNDWATER FLOW IN RESPONSE TO ALTERATION TO THE
      SYSTEM. THE THIRD ASPECT IS CONCERNED WITH THE MOVEMENT OF POLLUTANTS
      IN RESPONSE TO ALTERNATIONS OF THE HYDRAULIC SYSTEM. THE FOURTH
     ADDRESSES THE MOVEMENT OF FLUIDS AND CONTAMINANTS IN THE UNSATURATED ZONE.
      THE OBJECT OF THIS PROJECT IS TO EVALUATE EXISTING MODELS OF EACH OF
     THESE ASPECTS IN ORDER TO JUDGE THE STATE OF KNOWLEDGE AND TO POINT OUT
      AREAS ON A SOUND AND LOGICAL BASIS. INDIRECTLY, THE PROJECT MAY
     PROVIDE GUIDELINES FOR OPTIMIZING THE DESIGN OF MONITORING NETWORK.
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DEVELOPMENT OF A USER'S MANUAL FOR THE ARM AND NPS MODELS

  START/ COMPL DATE :    06/75 - 09/77 : FUNDING : EST. - FY   77  / $   25000
   TASK/EPA CODE :K6178-416     / R803722-02  (GRANT)  PRIOR  FY76 / $   900001
  PROJECT OFFICER : L A  MULKEY
  INVESTIGATORS :    N H CRAWFORD
                     B A KRAEGER                       HYDROCOMP INCORPORATED
                     W H WAGGY                         HYDROCOMP INCORPORATED
                     J R HUNT                          HYDROCOMP INCORPORATED
                     A S DONIGIAN                      HYDROCOMP INCORPORATED
                     D C BEYERLEIN                     HYDROCOMP INCORPORATED
  MILE: 06/75 -START PROJECT                           HYDROCOMP INCORPORATED
        11/77 -PUBLICATION OF USER MANUAL
   THE OBJECTIVE OF THIS EFFORT IS THE DEVELOPMENT OF A COMPREHENSIVE USER'S
   GUIDE FOR RELEASE WITH THE EPA AGRICULTURAL RUNOFF MANAGEMENT MODEL (ARM)
   AND THE EPA NON-POINT SOURCE MODEL (NPS). THE MANUAL WILL INCLUDE GUIDANCE
    FOR CALIBRATION, PARAMETER ESTIMATION METHODOLOGIES AND DATA, AND MODEL
   USE METHODOLOGY. THE MANUAL WILL BE MADE GENERALLY AVAILABLE ALONG WITH
   COPIES OF THE SOURCE CODE AS REQUESTED.
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II-75

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DEVELOP/DEMONSTRATE GUIDELINES FOR SEDIMENT AND EROSION CONTROL
TECHNIQUES FOR HIGHWAY CONSTRUCTION SITES
   START/ COMPL DATE :    07/75 - 06/78 : FUNDING : EST. - FY   77  / $   80991
    TASK/EPA CODE :C611A-7104    / S803724      (GRANT)  PRIOR  FY75 / $  1890001
   PROJECT OFFICER : H E  MASTERS
   INVESTIGATORS :    F T CARUCCIO                       UNIV. OF SOUTH CAROLINA
   MILE: 05/75 -START
         02/77 -COMPLETE FIELD DATA COLLECTION
         10/77 -COMPLETE SWIRL EVALUATION
         06/78 -COMPLETION
     THE MAIN OBJECTIVE IS TO DEMONSTRATE THE EVALUATE THE EFFECTIVENESS OF
     VARIOUS SEDIMENT CONTROL MEASURES IN A REPRESENTATIVE PRISTINE SITE
     LOCATED IN THE SOUTHEAST PIEDMONT AND SCHEDULED FOR FUTURE DEVELOPMENT.
     INCLUDED WILL BE THE EVALUATION OF A SWIRL UNIT AT A CONSTRUCTION SITE FOR
     SAND AND GRID REMOVAL. THE DATA DERIVED FROM THIS STUDY WILL BE PRESENTED
     IN GUIDELINE FORM, APPLICABLE TO OTHER AREAS IN A LARGE GEOGRAPHIC BELT
     IN THE SOUTHEAST HAVING SIMILAR GEOLOGIC AND CLIMATIC CONDITIONS.
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II-76

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EVALUATE SURFACE AND GROUNDWATER AT POTENTIAL STRIP MINE SITES
   START/ COMPL DATE :    05/75 - 06/78 : FUNDING : EST. - FY   77  / $  482000
    TASK/EPA CODE :86238-357    / R803727-03  (GRANT)  PRIOR  FY76 / $ 21410001
   PROJECT OFFICER : T G  NEWPORT
   INVESTIGATORS :   T T WILLIAMS
                     D G STUART                    MONTANA STATE UNIVERSITY
                     W   VANVOAST                  MONTANA COL. OF MIN. SC. & TE
                     R   KOOB                      MONTANA COL. OF MIN. SC. & TE
                     P   RICHARD                   NORTH DAKOTA STATE UNIVERSITY
  MILE: 05/75 -FUNDING PACKAGE SUBMITTED           UNIV. OF WYOMING
        06/75 -AWARD FUNDS FOR PROJECT
        07/76 -FUNDING INCREMENT
        07/77 -FUNDING INCREMENT
        06/78 -FINAL REPORT RECEIVED
   MAJOR OBJECTIVE OF THIS PROJECT IS TO IDENTIFY POSSIBLE IMPACTS OF COAL
   MINING AND DEVELOPMENT IN THE NORTHERN GREAT PLAINS ON THE SURFACE AND
   GROUNDWATER SYSTEMS OF THE SURROUNDING AREA. SPECIFIC OBJECTIVES ARE: 1)
   OBTAIN AN EQUATION OF BALANCE FOR ALL WATER INFLOW AND OUTFLOW IN EACH OF
   THREE STUDY SITES, ONE EACH IN MONTANA, NORTH DAKOTA AND WYOMING; 2) CHAR
   ACTERIZE THE OVERBURDEN FROM A PHYSICAL AND CHEMICAL POINT OF VIEW AS WELL
    AS DETERMINE ITS RELATIONSHIP TO THE WATER COMING TO THE SURFACE; 3)
   DETERMINE HYDROLOGIC CHARACTER OF SPOILS AT ACTIVE MINE SITES IN MONTANA;
   4) CHARACTERIZE THE CHEMICAL FEATURES OF THE MINED SITES. THE
   PROPOSED WORK IS A KEY EFFORT IN THE EPA PROGRAM TO ASSESS THE SURFACE AND
   GROUNDWATER PROBLEMS ASSOCIATED WITH WESTERN COAL. THREE SITES ARE BEING
   STUDIED COMPREHENSIVELY. EACH SITE IS JUST COMMENCING TO HAVE IMPACT. BASE
   LINE DATA WERE OBTAINED BEFORE IMPACTS BEGAN. IN ADDITION TO THE SITE-SPEC
   IFIC WORK, SOME DATA ARE BEING COLLECTED AT THE TWO ACTIVE MINING SITES IN
   MONTANA TO PROVIDE ADDITIONAL DATA FOR THE ANALYSES.
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II-77

CHEMICAL MODELING OF METALLIC WASTE DISPOSAL

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START/ COMPL DATE :    05/77 - 05/78 : FUNDING : EST. - FY   77  / $   30610
 TASK/EPA CODE :P608C-02     / R803738      (GRANT)  PRIOR  FY76 / $   526901
PROJECT OFFICER : E W  DAVEY
INVESTIGATORS :    F M MOREL                        MASS. INST. OF TECHNOLOGY
MILE: 05/78 -FINAL REPORT ENTITLED, "CHEMICAL MODELING OF METALLIC WASTE DIS
  A METHODOLOGY HAS PREVIOUSLY BEEN DEVELOPED FOR THE STUDY OF METALLIC W
  ASTES IN COMBINED DOMESTIC AND INDUSTRIAL SEWAGE. THE METHODOLOGY IS BASED
   ON GENERAL CHEMICAL MODELS OF THE WASTE AND OF VARIOUS DILUTIONS OF
  THE WASTE WITH SEAWATER AND HAS BEEN APPLIED TO THE SPECIFC CASE OF THE
  LOS ANGELES COUNTY WASTEWATER DISCHARGE. IT IS PROPOSED TO EXTEND AND
  IMPROVE THIS WORK USING A NEW CASE STUDY SUCH AS THE DUMPING OF CON
  CENTRATED ACIDIC METALLIC WASTES. THE PROPOSED WORK WILL INVOLVE INCLUSION
   OF NEW CHEMICAL DATA IN THE MODEL, IMPROVEMENT OF EXISTING COMPUTER PR
  OGRAM FOR EFFICIENCY AND CONVENIENCE, SIMPLIFICATION AND GENERALIZATION OF
  ABSORPTION SUBROUTINES AND, IF NECESSARY, IMPLEMENTATION OF SPECIFIC
  KINETIC SUBROUTINES RELATED TO THE ACID WASTES DISPOSAL PROBLEM. THE
  GOAL OF THE PROJECT IS TO IMPROVE OUR PREDICTIVE CAPABILITIES FOR ROUTINE
  USE IN THE VARIOUS MONITORING, IMPACT ASSESSMENT AND REGULATION
  ACTIVITIES ASSOCIATED WITH METALLIC WASTE DISPOSAL.
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OPTIMAL SAMPLING STRATEGIES FOR WATER QUALITY IN LARGE LAKES

  START/ COMPL DATE :    11/75 - 09/77 : FUNDING : EST. - FY   77  / $   38552
   TASK/EPA CODE :N608A-012    / R803754-02  (GRANT)  PRIOR  FY76 / $   311461
  PROJECT OFFICER : D M  DOLAN
  INVESTIGATORS :   R P CANALE
                    W F POWERS                     UNIV. OF MICHIGAN
                                                   UNIV. OF MICHIGAN
  MILE: 09/76 -METHODOLOGY DEVELOPED, 1ST EXAMPLE PRESENTED
        09/77 -2ND EXAMPLE COMPLETED, SAMPLE DELIVERED
    THE OVERALL OBJECTIVE OF THE GRANT IS TO DEVELOP A METHODOLOGY THAT WILL
    SPECIFY THE OPTIMAL SAMPLING STRATEGY FOR LARGE LAKES BY MINIMIZING
     COSTS AND EXPERIMENTAL ERROR AND MAXIMIZING THE VALUE OF THE SAMPLING
     INFORMATION OBTAINED.
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803735

II-79

Objectives: (1) To determine the source, transfer and transformation of potential pollutants on a rangeland watershed grazed by beef cows. (2) To determine and monitor the hydrologic and meteorologic parameters necessary to establish the water budget and movement of potential pollutants from a rangeland watershed in Central Oklahoma. (3) To determine effects of environmental conditions on the rate of degradation of grazing cattle feces on rangeland. (4) To determine effects of cattle waste concentration, chemical composition and distribution on levels of potential pollutants in rangeland soils.

Approach:

The water budget of the 70 hectare watershed will be determined by measuring precipitation, soil water storage, and runoff. Evapotranspiration will be determined by difference and from meteorological data. The source, transfer and transformation of potential pollutants will be determined by measuring selected nutrient levels in soil, plant, precipitation, feces and runoff water and sediment samples. Seasonal rates of degradation will be determined by periodically measuring the quantity and chemical composition of feces and selected soil, plant and microclimatic factors. Forage chemical composition and utilization, cattle diet and grazing behavior, and feces and urine distribution will be also determined periodically.

Current Plans:

The soil, vegetation, and topographic surveys will begin as soon as funding is granted. Soil, plant and cattle studies will begin after the surveys and inventories are completed. Meterological studies will begin after the necessary instruments are purchased and made operational on the watershed. Runoff water and sediment sampling will begin as soon as construction of the weir and installation of the sampler is completed. Laboratory analysis will be conducted with minimum time lapse after collection.

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STUDY OF VEGETATION PROBLEMS ASSOCIATED WITH REFUSE LANDFILLS

   START/ COMPL DATE :    05/75 - 05/77 : FUNDING : EST. - PY   77  / $   38783
    TASK/EPA CODE :C618A-7030   / R803762-02  (GRANT)  PRIOR  FY76 / $   900001
   PROJECT OFFICER : R E  LANDRETH
   INVESTIGATORS :    F B FLOWER
                      R E LANDRETH                     RUTGERS THE STATE UNIVERSITY
   MILE: 01/75 -GRANT AWARDED                          U.S. ENVIRON. PROTECTION AGCY
         08/76 -INTERIM REPJRT
         05/78 -PROJECT COMPLETED
         09/78 -FINAL REPOHT
    TO EVALUATE THE CAUSE AND EFFECT RELATIONSHIP OF REFUSE LANDFILL GASES ON
    SURROUNDING LANDFILL VEGETATION BY PERFORMING FIELD AND LABORATORY
    STUDIES. THE FIRST YEAR'S EFFORT INCLUDED A COMPREHENSIVE LITER
    ATURE SURVEY RESULTING IN FINDINGS THAT MINIMAL DATA EXIST ON THE SUBJECT.
    ALSO, A MAIL SURVEY CONDUCTED DURING THE FIRST YEAR INDICATED THAT MOST OF
    THE PROBLEMS WERE IDENTIFIED IN THE EASTERN PART OF THE UNITED STATES. A
     COMPREHENSIVE LABORATORY AND FIELD EVALUATION PROGRAM WITH SELECTED VE
    GETATION IS PLANNED FOR THE SECOND YEAR. THE RESULTS WILL BE COMBINED TO D
    EVELOP A DESIGN MANUAL FOR THE UTILIZATION OF APPROPRIATE VEGETATIVE COVER
     FOR LANDFILLS.
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NEOPLASTIC AND LIFE SPAN EFFECTS OF LOW LEVEL EXPOSURE TO HTO DURING
PREGNANCY IN RATS
   START/ COMPL DATE :    06/76 - 06/79 : FUNDING : EST. - FY   77  / $       0
    TASK/EPA CODE :H628A-7450   / R803764     (GRANT)  PRIOR  FY76 / $   300001
   PROJECT OFFICER : J W  LASKEY
   INVESTIGATORS :   W W JOHNSON                   ST. AUGUSTINES COLLEGE
   MILE: 06/76 -INITIATE ANIMAL EXPOSURES
         06/77 -ANNUAL REPORT
         08/77 -COMPLETE ANIMAL EXPOSURES
         06/78 -ANNUAL REPORT
         06/79 -FINAL REPORT
     THIS STUDY WAS DESIGNED TO EVALUATE THE EXTENT OF TUMORIGENIC AND LIFE
     SPAN ALTERATION DUE TO EXPOSURE TO TRITIUM DURING PREGNANCY.
     LABORATORY RATS ARE EXPOSED TO TRITIUM FROM CONCEPTION THROUGH GESTATION.
     DAMS ARE ALLOWED TO NURSE THEIR YOUNG FOR 21 DAYS AND ARE THEN PLACED ON
     LONG TERM OBSERVATION. THEY ARE EXAMINED MONTHLY FOR TUMORS AND OVERALL
     HEALTH. TO DATE, ALL OF THE 250 ANIMALS HAVE BEEN EXPOSED. LONG-TERM
     OBSERVATION AND MAINTENANCE IS IN PROGRESS.
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803765

II-82

The method of digital photo electron auto-correlation technique in Laser Doppler Spectroscopy (LDS) is applied in determining essentially the size of particulates in aerosols and hydrosls in the laboratory. The application of the technique in the characterization of the scattered and transmitted light will be investigated. The results will be compared with the relatively unexplored but reliable conventional scattering measurements based on Specific turbidity and Turbididity spectrum. The validity of the results will be further tested by Electron microscopic measurements.

The development of the above methods and their relative merits with respect to other routine methods in their application to the in-situ monitoring of particulates in stationary source emission will be studied and critically discussed. The results obtained by the proposed research are expected to indicate greater accuracy, speed, and ease of measurement which makes the technique employed potentially important in the field of pollution monitoring, especially in the determination of particulate size in smoke plumes.

803785

The principal objective of this grant is to demonstrate feasibility of on-line pest control which utilizes ecosystem models in pest management programs. Our approach is to use the models synchronized with real time environmental information concerning the abiotic and biotic state of the pest crop ecosystem. This will be accomplished by concurrent developments in eight principal areas: (a) multiterminal interface programs for integrating economic abiotic and biotic information. (b) ecosystem models, (c) algorithms for updating models from field information, (d) microclimatic models, (e) spatial variations in a multispecies ecosystem, (f) determination of biological windows using the models and appropriate management strategies, (g) economic models that determine the economic thresholds using the environmental and biological information of the pest crop ecosystem, market conditions, etc., and (h) evaluation of the different management strategies. Models have been developed for host crop, pest populations, and two parasitoids. Microclimatic models which relate soil temperature at various depths to air temperature were developed.

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VEGETATIVE STABILIZATION OF PARAHO SPENT OIL SHALE

   START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST, - FY   77  / $   69000
    TASK/EPA CODE :B623B-359     / R803788-03  (GRANT)  PRIOR  FY76 / $  1280001
   PROJECT OFFICER : E F  HARRIS
   INVESTIGATORS :   W A BERG                         COLORADO STATE UNIVERSITY
   MILE: 03/75 -FUNDING PACKAGE SUBMITTED
         07/75 -AWARD FUNDS FOR PROJECT
         07/76 -ANNUAL REPORT
         09/76 -CONTINUATION AWARDED
         12/76 -AMENDMENT
         08/77 -FINAL REPORT RECEIVED
     THE OBJECTIVE OF THIS RESEARCH PROJECT IS TO STUDY SURFACE STABILITY AND
     WATER MOVEMENT IN AND THROUGH THE PARAHO SPENT OIL SHALES, IN
     ADDITION TO THE VEGETATIVE STABILIZATION STUDIES, THE DISTRIBUTIONS OF W
     ATER AND SALTS IN THE PLOTS WILL BE MONITORED WITH THE OBJECTIVE OF QUANTI
     FYING THE POTENTIAL SALT POLLUTION FROM SHALE RESIDUES, IT IS NOT POSSIBLE
     TO EXPERIMENTALLY MODEL THE ACTUAL PROTOTYPE DISPOSAL, FOR THIS REASON,
      DATA FROM PLOT STUDIES WILL BE USED TO DEVELOP AND VERIFY A MATH
     EMATICAL MODEL OF SALT AND WATER TRANSPORT, THIS MODEL WILL BE USED TO EST
     IMATE THE LONG TERM WATER QUALITY ASPECTS OF LARGE SCALE DISPOSAL OF SPENT
     SHALE RESIDUES,
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OXIDANT/PRECURSOR RELATIONSHIPS

START/ COMPL DATE : 07/75 - 09/77 : FUNDING : EST. - FY 77 / $ 30000
TASK/EPA CODE :G603A-AJ-01 / R803799-02 (GRANT) PRIOR FY76 / $ 400001
PROJECT OFFICER : J J BUFALINI
INVESTIGATORS : E R STEPHENS UNIV. OF CALIFORNIA
D P HELLRICH UNIV. OF CALIFORNIA
MILE: 06/77 -FINAL REPORT

THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP, DEMONSTRATE, AND USE METHODS AND PROCEDURES FOR CLARIFYING THE RELATIONSHIP BETWEEN OXIDANT PRECURSORS (SPECIFICALLY HYDROCARBONS AND OXIDES OF NITROGEN) AND OXIDANT (OZONE) BASED ON STUDIES OF AMBIENT AIR. UNDERSTANDING OF THIS RELATIONSHIP IS VITAL TO SOUND DEVELOPMENT OF CONTROL STRATEGY, AIR QUALITY STANDARDS, AND EMISSION STANDARDS. IN PHOTOCHEMICAL SMOG THE MAJOR HEALTH HAZARD (OZONE) IS A SECONDARY PRODUCT OF A VERY COMPLEX REACTION OF PRIMARY POLLUTANTS (HYDROCARBONS AND NITRIC OXIDE) WHICH ARE NOT THEMSELVES HIGHLY TOXIC. A NEW GAS CHROMATOGRAPHIC PROCEDURE HAS BEEN DEVISED WHICH PERMITS DIRECT MEASUREMENT OF AMBIENT CONCENTRATIONS OF METHANE, ETHANE, ETHENE, ACETYLENE AND TOTAL C3 HYDROCARBONS. THIS PROCEDURE IS AUTOMATED TO PROVIDE REPETITIVE SAMPLES AROUND THE CLOCK. THESE DATA WILL BE COMPARED WITH NOX DATA AND OXIDANT LEVELS TO BETTER DEFINE THE RELATIONSHIP BETWEEN OXIDANT AND ITS PRECURSORS, HYDROCARBON AND NITROGEN OXIDES. THE INTENSIVE DATA COLLECTION PHASE OF THE PROJECT IS JUST BEGINNING.

INFILTRATION LAND TREATMENT OF STABILIZATION POND EFFLUENT

START/ COMPL DATE : 06/75 - 05/78 : FUNDING : EST. - FY 77 / $ 51040
TASK/EPA CODE :IL611C-47 / R803804 (GRANT) PRIOR FY76 / $ 790901
PROJECT OFFICER : C G ENFIELD
INVESTIGATORS : J N DORNBUSH SOUTH DAKOTA STATE UNIVERSITY
MILE: 03/77 -EVALUATE 75 CM SOIL FOR WASTEWATER TREATMENT
03/78 -EVALUATE 150 CM SOIL FOR WASTEWATER TREATMENT

THREE PILOT INFILTRATION-PERCOLATION BASINS OF ABOUT 1/6 ACRE EACH HAVE BEEN CONSTRUCTED WITH UNDERDRAINS AT A DEPTH OF 2 1/2 FEET IN SILTY LOAM SOIL. THE NORMAL GROUND WATER DEPTH IS ABOUT 4 FEET. STABILIZATION POND EFFLUENT IS APPLIED AT WEEKLY INTERVALS IN QUANTITIES EQUIVALENT TO A DEPTH OF 18 OR 24 INCHES. SAMPLES COLLECTED FROM THE INFLUENT AND EFFLUENT DRAIN OF EACH BASIN ARE ANALYZED FOR BOD5, SUSPENDED SOLIDS; AMMONIA, NITRATE AND KJELDAHL NITROGEN; ORTHO AND TOTAL PHOSPHORUS, SPECIFIC CONDUCTANCE AND FECAL COLIFORMS. INFILTRATION RATES ARE DETERMINED USING AUTOMATIC FLOAT RECORDERS IN EACH BASIN. GROUNDWATER LEVELS AND QUALITY ARE ALSO MONITORED FOR THE AREA. SPECIFIC PROJECT OBJECTIVES ARE: 1. DEMONSTRATE THE USE OF INFILTRATION-PERCOLATION LAND DISPOSAL AS A MEANS OF UP-GRADING EXISTING SECONDARY TREATMENT TO MEET NEW EFFLUENT STANDARDS. 2. DETERMINE ACCEPTABLE LOADING RATES FOR BOTH A SCARIFIED AND UNDISTURBED SOIL FOR CLIMATIC CONDITIONS SIMILAR TO THOSE AT BROOKINGS, SOUTH DAKOTA. 3. IDENTIFY WINTER OPERATING CONSTRAINTS IMPOSED BY THE CLIMATIC CONDITIONS OF THE SITE. DATA HAS BEEN COLLECTED SINCE JUNE 1975 AND A TECHNICAL PROGRESS REPORT HAS BEEN PREPARED DESCRIBING THE CONSTRUCTION AND OPERATION OF THE UNIT INTO THE SUMMER OF 1976.

803805

II-87

The objective of this grant supplement is to allow completion of the research program on hydrolysis and wish-out of the halogenated oxidation products formed from halocarbon pollutants in the air.

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REACTIONS OF SULFUR DIOXIDE IN AEROSOLS

   START/ COMPL DATE :    08/76 - 07/78 : FUNDING : EST, - FY   77  / $   50000
    TASK/EPA CODE :G625B-EA-22  / R803814-02  (GRANT)  PRIOR  FY76 / $   200001
   PROJECT OFFICER : -    DURHAM
   INVESTIGATORS :   D M HIMMELBLAU                 UNIV, OF TEXAS
   MILE: 06/78 - FINAL REPORT
     THE OBJECTIVE OF THIS STUDY IS TO DETERMINE THE RATE AND EXTENT OF REAC
     TION OF SULFUR DIOXIDE AND OTHER AIR POLLUTANTS AT PPM CONCENTRATIONS WITH
      AEROSOL DROPLETS OF THE ORDER OF SIZE OF ONE MICRON, IN THE INIT
     IAL EXPERIMENTS RADIOACTIVE 35SO2 WILL BE TRANSFERRED TO AEROSOLS, AND THE
     TOTAL RADIOACTIVE SULFUR TRANSFERRED COUNTED, MODELS OF THE MASS TRANSFER
     AND REACTION WILL BE FIT BY THE EXPERIMENTAL DATA, AND USED TO ELUCIDATE
     THE EXTENT OF REACTION AND OXIDATION TO SULFATE,
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II-89

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NUTRITIONAL REQUIREMENTS OF MARINE LARVAL AND JUVENILE FISH

    START/ COMPL DATE :    07/75 - 07/78 : FUNDING : EST. - FY   77  / $   25000
     TASK/EPA CODE :P608C-04      / R803818-03  (GRANT)  PRIOR  FY76 / $   500001
    PROJECT OFFICER : A D  BECK
    INVESTIGATORS :   K L SIMPSON                        UNIV. OF RHODE ISLAND
                      C O CHICHESTER                     UNIV. OF RHODE ISLAND
                      T   LEE                            UNIV. OF RHODE ISLAND
    MILE: 07/78 -FINAL REPORT ENTITLED, "NUTRITIONAL REQUIREMENTS OF MARINE LARV
      OBJECTIVES: THE PRIMARY OBJECTIVE OF THIS PROPOSAL IS THE DEVELOPMENT OF
     METHODS AND TECHNIQUES TO FORMULATE LABORATORY DIETS FOR LARVAL AND J
     UVENILE MARINE FISH. SUCH DIETS ARE NEEDED IN ORDER TO ACHIEVE HIGH LEVELS
     OF SURVIVAL AND FIELD-COMPARABLE GROWTH OF LABORATORY-CULTURED ANIMALS. IF
       SUCCESSFUL, THE LABORATORY MARINE FISH WILL EXHIBIT MINIMUM VARI
     ABILITY IN LAB BIOASSAY DUE TO NUTRITIONAL STRESS. MENIDIA MENIDIA WILL BE
       USED AS A TEST FISH. APPROACH: TEST DIETS WILL BE EVALUATED FOR P
     ROTEIN AVAILABILITY AND STORAGE STABILITY. THE NUTRITIONAL STATUS OF FIELD
     AND DIET-FED POPULATIONS WILL BE COMPARED. THE LIFE HISTORY STAGES
     WILL INCLUDE EGGS, YOLK-SAC LARVAE, POST-YOLK-SAC LARVAE AND JUVENILES. C
     URRENT PLANS: APPARENT NUTRITIONAL NEEDS WILL BE DETERMINED BY QUALITATIVE
     ANALYSIS OF EGGS, YOLK-SAC LARVAE, POST-YOLK-SAC LARVAE AND JUVENILES. THE
     SOURCES OF NUTRIENTS WILL BE DETERMINED BY QUALITATIVE ANALYSIS OF LABOR
     ATORY-PREPARED LIVE OR ARTIFICIAL FOOD MATERIALS. THE TEST DIETS FORMULATE
     D FROM QUALITATIVE INFORMATION WILL THEN BE ASSESSED FOR PROTEIN AVAILABIL
     ITY AND STORAGE STABILITY USING GROWTH STUDIES WITH THE TEST FISH, RAT AND
       RAINBOW TROUT. FINALLY, THE NUTRITIONAL STATUS OF THE LARVAE AND JU
     VENILES WILL BE COMPARED WITH FIELD POPULATIONS USING APPROPRIATE RESPONSE
     PARAMETERS: SURVIVAL, GROWTH, BIOCHEMISTRY, BEHAVIOR AND STRESS
     RESPONSE.
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USE OF SIMULATION FOR CHARACTERIZING TRANSPORT IN SOILS ADJACENT TO LAND DISPOSAL SITES

START/ COMPL DATE : 11/75 - 02/78 : FUNDING : EST. - FY 77 / $ 14295
TASK/EPA CODE :C618A-7031 / R803827-02 (GRANT) PRIOR FY76 / $ 811741
PROJECT OFFICER : M H ROULIER
INVESTIGATORS : G F PINDER PRINCETON UNIVERSITY
W P SAUKIN PRINCETON UNIVERSITY
MILE: 11/75 -PROJECT START
02/78 -PROJECT COMPLETION

OBJECTIVES: DEVELOP AND TEST A SIMULATION TECHNIQUE FOR PREDICTING THE MOVEMENT OF NONCONSERVATIVE SOLUTES IN SATURATED AND UNSATURATED SOILS. APPROACH: AN EXISTING DIGITAL COMPUTER, GALERKIN-FINITE ELEMENT, TRANSIENT, TWO-DIMENSIONAL, CROSS-SECTIONAL, SATURATED FLOW, CONSERVATIVE SOLUTE MODEL IS BEING MODIFIED TO DESCRIBE MOVEMENT OF A SINGLE, NON-CONSERVATIVE SOLUTE IN BOTH SATURATED AND UNSATURATED SOILS IN LARGE, THREE-DIMENSIONAL SYSTEMS. THE MODEL WILL BE FIELD TESTED USING CONTAMINANT MONITORING DATA FROM AN EXISTING LANDFILL OR OTHER LAND DISPOSAL SITE. PROGRESS: (9 MONTHS) SOLUTE MOVEMENT PROBLEMS HAVING EXACT SOLUTIONS WERE SOLVED USING A FINITE DIFFERENCE PROCEDURE AND A GALERKIN FINITE ELEMENT PROCEDURE TO CALCULATE THE DERIVATIVES OF CONCENTRATION AND VELOCITY WITH RESPECT TO DISTANCE AND A THIRD ORDER CORRECT FINITE DIFFERENCE PROCEDURE TO CALCULATE THE TIME DERIVATIVES. FOR THE GALERKIN FINITE ELEMENT PROCEDURE THE FOLLOWING WERE TESTED AS BASIS FUNCTIONS: FIRST AND SECOND ORDER CONTINUOUS HERMITEAN POLYNOMIALS AND ZERO ORDER CONTINUOUS LINEAR, QUADRATIC, AND CUBIC FUNCTIONS. COMPARISON OF THE RESULTS OF THESE VARIOUS CALCULATIONS WITH THE EXACT SOLUTIONS SHOWED THAT THE GALERKIN FINITE ELEMENT PROCEDURE USING FIRST AND SECOND CONTINUOUS HERMITEAN POLYNOMIALS AS BASIS FUNCTIONS PROVIDED THE MOST SATISFACTORY COMBINATION OF ACCURACY AND COMPUTATIONAL EFFICIENCY, PARTICULARLY FOR LARGER VALUES OF THE TIME STEP, NODE SPACING, AND DISPERSION COEFFICIENT. BECAUSE THE FIRST DERIVATIVES OF HERMITEAN POLYNOMIALS ARE CONTINUOUS AT ELEMENT BOUNDARIES, USE OF THESE POLYNOMIALS ALLOWS CALCULATION OF A CONTINUOUS FLOW FIELD AND HELPS TO MINIMIZE SOLUTE MASS BALANCE ERRORS WHICH MAY OCCUR WITH OTHER METHODS. FUTURE WORK WILL MODIFY THE MODEL TO ACCOUNT FOR ADSORPTION/DECAY OF SINGLE, NON-CONSERVATIVE SOLUTES AND WILL TEST THE MODEL WITH DATA FROM AN EXISTING LANDFILL.

The primary objective of this demonstration is to demonstrate the technical and economic feasibility of composting raw dewatered municipal sewage sludge by high rate suction aeration under the adverse climatic conditions typically experienced by many of the municipalities located in the New England, Great Lakes, Midwestern, and Northwestern states. Secondary objectives consist of a wide range of operational and procedural elements all related directly or indirectly to the physical location and climatological conditions of this demonstration.

The sludge will be delivered to the site once per week at a volume of approximately 50 cu. yd. Upon arrival at the site wood chips are mixed with the sludge at a ratio of 3:1, wood chips to sludge by volume. The mixture is then moved to the composting area which is a concrete pad with two twenty feet lengths of pipe connected to a blower. The blower operates at two minute intervals every twenty minutes. The blower draws air through the mixture and assists the composting pile in achieving higher and more even temperature distribution. The wood chips absorb moisture and create voids which also assist in the thermal distribution and assist in keeping a constant oxygen content. Temperatures must exceed 55 degrees Centigrade throughout the pile to insure complete pathogen kill. Therefore, temperature and oxygen content must be monitored daily. The entire process takes approximately fourteen days. An additional thirty days of curing after the pile is removed from the blower area is recommended before use, as the pile will continue to compost naturally. The final product is useful as a supplement to commercial fertilizer and can assist in lowering the cost of maintaining public land. Also the disposal of sludge is eliminated and if successful this process will eliminate the need for expensive digesters presently used in secondary waste water treatment plants.

The demonstration will commence in May 1975.

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SUBLETHAL EFFECTS OF OIL ON BEHAVIOR AND CHEMICAL SENSES OF MARINE
ANIMALS
   START/ COMPL DATE :    11/75 = 10/78 : FUNDING : EST, = FY   77  / $   57000
    TASK/EPA CODE :P608C=06      / R803833=03  (GRANT)  PRIOR  FY76 / $  1102481
   PROJECT OFFICER : D    MILLER
   INVESTIGATORS :   J   ATEMA                      BOSTON UNIVERSITY
                     S   JACOBSON                   BOSTON UNIVERSITY
                     S   OLESZKOSZUTS               BOSTON UNIVERSITY
   MILE: 10/78 -FINAL REPORT, "SUBLETHAL EFFECTS OF OIL ON BEHAVIOR AND CHEMICA
     GENERAL OBJECTIVE: TO DETERMINE IF AND HOW PETROLEUM HYDROCARBONS AFFECT
     CHEMORECEPTION AND CHEMICALLY=STIMULATED BEHAVIOR IN MARINE
     ANIMALS, CHEMORECEPTION AND BEHAVIOR OF LOBSTERS: A) MEASURE EFFECTS OF 0.
     1=1.5 PPM #2 FUEL OIL (WATER ACCOMMODATED FRACTION) ON FEEDING AND GENERAL
      BEHAVIOR OF LOBSTERS: DETAILED BAHAVIOR ANALYSIS, DETERMINE THE N
     ARROW RANGE OF EXPOSURE LEVELS THAT CAUSE EFFECTS ON CHEMICALLY STIMULATED
      BEHAVIOR, WITHOUT CAUSING GROSS NEUROMUSCULAR DEFICIENCIES, B)
     DOCUMENT STIMULUS EFFECTS OF DIRECT APPLICATION OF 1=10 PPM #2 FUEL OIL
     (WAF) ON NEUROPHYSIOLOGICAL RESPONSES OF ANTENNULAR CHEMORECEPTORS OF
     LOBSTERS, C) DETERMINE EFFECTS OF DIFFERENT PETROLEUM HYDROCARBONS FR
     ACTIONS ON LOBSTER BEHAVIOR AND CHEMORECEPTION USING SELECTED COMPOUNDS FR
     OM CHEMICAL SEPARATED FRACTIONS, D) DETERMINE CONTRIBUTION OF OIL=AFFECTED
      CHEMORECEPTION ON BEHAVIORAL DEFICITS: NEUROPHYSIOLOGY AND
     MORPHOLOGY OF OIL=EXPOSED LOBSTER ANTENNULES, COMPARISON OF OIL EFFE
     CTS ON LOBSTERS WITH AND WITHOUT ANTENNULES, SYNTHESIS OF PROJECT RESULTS.
     CHRONIC EFFECTS ON FIELD POPULATIONS: A) COMPARE FEEDING, SUBSTRATE
     SELECTION, AND ANTI=PREDATOR BEHAVIOR OF THREE INSHORE SPECIES (CRANGON
     SEPTEMSPINOSUS, FUNDULUS HETEROCLITUS, AND PSEUDOPLEURONECTES AMERICANUS
     FROM OIL SPILL AND UNCONTAMINATED SITES ALONG BUZZARDS BAY, MASSA
     CHUSETTS, B) COMPARE FEEDING AND GENERAL BEHAVIOR OF LOBSTERS (HOMARUS AMA
     ERICANUS) TAKEN FROM OIL SPILL AREAS AND CLEAN HABITATS, IMMEDIATELY AFTER
      A SPILL, IF ONE OCCURS, C) COMPARE ALARM AND FEEDING RESPONSES OF NAS
     SARIUS OSBOLETUS TAKEN FROM OILED AND CLEAN HABITATS, APPROACH: BEHAVIORAL
     AND NEUROPHYSIOLOGICAL BIOASSAYS; FLOW=THROUGH OIL DOSING; CHEMICAL MONIT
     ORING OF EXPOSURE LEVELS, PROGRESS: LOW SUBLETHAL LEVELS OF NO, 2 FUEL OIL
     (WAF) INTERFERE WITH LOBSTER FEEDING BEHAVIOR AND OIL ACTS AS A CHEMICAL
     STIMULUS ON DISTANCE CHEMORECEPTORS,
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II-93

FATE AND EFFECTS OF ATRAZINE IN SALT MARSH ECOSYSTEMS

START/ COMPL DATE :   07/75 - 06/78 : FUNDING : EST. - FY   77 / $ 40400
TASK/EPA CODE :07148-3-03   / R803835-03 (GRANT) PRIOR FY76 / $ 966201
PROJECT OFFICER : F G WILKES
INVESTIGATORS :   D E DAVIS   AUBURN UNIVERSITY
                  J D WEETE   AUBURN UNIVERSITY
MILE: 06/78 -FINAL REPORT

THE RESEARCH WILL INVESTIGATE THE ACCUMULATION, DEGRADATION, AND EFFECTS OF ATRAZINE ON A SERIES OF MODEL ECOSYSTEMS CONSISTING OF ORGANISMS FROM A SALT MARSH. INITIALLY, THE EFFECTS AND FATE OF ATRAZINE APPLIED TO THE PRIMARY AUTOTROPH OF A GEORGIA SALT MARSH, SPARTINA ALTERNIFLORA, ROOTED IN WASHED SAND IN SEA WATER, WILL BE STUDIED. WHEN THAT PHASE OF THE RESEARCH HAS BEEN COMPLETED OTHER ORGANISMS WILL BE ADDED, ONE AT A TIME, AND THE EFFECTS OF ATRAZINE AND ATRAZINE METABOLITES ON THESE ADDITIONAL COMPONENTS OF THE SYSTEM WILL BE ESTABLISHED. THE ORGANISMS TO BE ADDED REPRESENT DIFFERENT TROPHIC LEVELS AND PATHWAYS IN THE FOOD WEB AND WILL BE SELECTED FROM AMONG SESARMA RETICULATA, PALAEOMONETES VULGARIS, UCA PUGNAX, MODIOLUS DEMISSUS, AND FUNDULUS GRANDIS. THE DATA OBTAINED FROM THE MODEL SYSTEMS WILL BE COMPARED WITH DATA OBTAINED FOR SIMILAR SPECIES HARVESTED FROM ATRAZINE-TREATED PLOTS LAID OUT IN THE SAPELO ISLAND SALT MARSH. A SEPARATE BUT RELATED STUDY WILL BE MADE OF THE EFFECTS OF ATRAZINE ON DIATOMS PRESENT IN THE SALT MARSH. THIS WILL INCLUDE MEASURING THE EFFECTS OF DIFFERENT CONCENTRATIONS OF ATRAZINE ON THE GROWTH AND CARBON FIXATION BY PURE CULTURES OF THE TWO OR THREE OF THE MOST IMPORTANT DIATOM SPECIES IN THE MARSH AND MONITORING POPULATION SHIFTS IN THE MARSH AFTER ATRAZINE TREATMENT.

II-94

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EFFECTS OF KEPONE ON LARVAL DEVELOPMENT OF CALLINECTES SAPIDUS AND
RHITHROPANOPEUS HARRISII
   START/ COMPL DATE :    08/77 - 07/78 : FUNDING : EST. - FY   77  / $   25000
    TASK/EPA CODE :Q714B-3-16   / R803838-02  (GRANT)  PRIOR  FY76 / $   999931
   PROJECT OFFICER : D R  NIMMO
   INVESTIGATORS :   J D COSTLOW                      DUKE UNIVERSITY
                     C G BOOKHOUT                     DUKE UNIVERSITY
                     S   HERRING                      DUKE UNIVERSITY
   MILE: 07/78 -FINAL REPORT
     THE OBJECTIVES OF THE INVESTIGATION WILL BE TO DETERMINE: (1) THE LIMITS
     OF CONCENTRATION OF KEPONE IN WHICH THE MUD-CRAB, RHITHROPANOPEUS HARRISII
      GOULD, AND THE BLUE CRAB, CALLINECTES SAPIDUS, CAN BE REARED FROM
     HATCHING TO THE FIRST CRAB STAGE; (2) SUBLETHAL AND ACUTELY TOXIC CONCENTR
     ATIONS; (3) SUBLETHAL EFFECTS; (4) AND STAGES IN WHICH THE LARVAE ARE MOST
     SENSITIVE TO KEPONE. RANGE-FINDING AND DEFINITIVE EXPERIMENTS
     WILL BE CONDUCTED ON FOUR REPLICATE SERIES OF R. HARRISII AND C. SAPIDUS
     LARVAE EXPOSED TO 0 AND FIVE OR SIX CONCENTRATIONS OF KEPONE. IN THE
     DEFINITIVE EXPERIMENTS WE SHOULD BE ABLE TO DETERMINE FOUR TO FIVE
     CONCENTRATIONS OF KEPONE WHICH SHOW DIFFERENTIAL SURVIVAL AND TO ASCERTAIN
     WHICH OF THESE ARE SUBLETHAL AND ACUTELY TOXIC CONCENTRATION
     S. THE PERCENT OF LARVAE WHICH PASS THROUGH ZOEAL AND MEGALOPA DEVELOPMENT
      WILL BE DETERMINED SEPARATELY. ATTENTION WILL BE GIVEN TO SUBLETHAL
     EFFECTS WHICH ARE CORRELATED WITH EACH INCREASE IN CONCENTRATION OF
     KEPONE, SUCH AS PROLONGED DURATION OF ZOEAL AND/OR MEGALOPA DEVEL
     OPMENT, EXTRA ZOEAL STAGES, MORPHOLOGICAL AND BEHAVIORAL ABNORMALITIES AND
     AUTONOMY OF THE LIMBS OF MEGALOPA. SENSITIVITY OF LARVAE TO KEPONE IN
     LARVAL STAGES WILL BE DETERMINED BY STATISTICAL ANALYSES OF
     MORTALITY DATA.
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II-95

HUMAN ENTERIC VIRUS SURVIVAL IN SOIL FOLLOWING IRRIGATION WITH SEWAGE PLANT EFFLUENTS

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   START/ COMPL DATE :    07/75 - 07/78 : FUNDING : EST. - FY   77  / $  112050
    TASK/EPA CODE :D607B-021    / R803844-03  (GRANT)  PRIOR  FY76 / $  1835421
   PROJECT OFFICER : E    AKIN
   INVESTIGATORS :    B P SAGIK                          UNIV. OF TEXAS
                      C A SORBER                         UNIV. OF TEXAS
                      B E MOORE                          UNIV. OF TEXAS
                      W W HAMMOND                        UNIV. OF TEXAS
   MILE: 07/78 -FINAL REPORT
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OBJECTIVES: THE OVERALL OBJECTIVE OF THIS STUDY IS TO EVALUATE THE SURVIVAL AND TRANSPORT OF ENTERIC VIRUSES AT LAND APPLICATION SITES FOR WASTEWATER FOLLOWING CONVENTIONAL WASTEWATER TREATMENT. SPECIFIC, DETAILED OBJECTIVES ARE: (A) TO DETERMINE THE SURVIVAL OF ENTEROVIRUSES DISTRIBUTED TO THE SOIL FOLLOWING WASTEWATER IRRIGATION; (B) TO FOLLOW THE MOVEMENT OF INDIGENOUS ENTEROVIRUSES AND BACTERIOPHAGES SPECIFIC TO E. COLI THROUGH THE UNSATURATED SOIL TONE VIA LYSIMETERS; (C) TO ASCERTAIN POSSIBLE MOVEMENT OF INDIGENOUS ENTEROVIRUSES AND BACTERIOPHAGES IN THE GROUNDWATER BENEATH MOVEMENT OF INDIGENOUS ENTEROVIRUSES AND BACTERIOPHAGES IN THE GROUNDWATER BENEATH WASTEWATER LAND APPLICATION SITE BY SAMPLING MONITORING WELLS; (D) TO CONDUCT A MASS BALANCE OF INDIGENOUS ENTEROVIRUSES ENTERING AND LEAVING THE SITE; (E) AND TO INITIATE THE STUDY OF THE PRESENCE IN WASTEWATER OF SPECIFIC PATHOGENS AND TO ASCERTAIN THEIR POSSIBLE PRESENCE IN SOILS AND LYSIMETER AND MONITORING WELL WATERS. APPROACH: SEVERAL SITES WOULD BE EVALUATED AS POTENTIAL STUDY SITES. IT WAS PLANNED TO CHARACTERIZE THE TREATMENT FACILITIES, SOILS, IRRIGATION SYSTEMS AND STREAMS AT THE SITES. ANALYSES WOULD BE CONDUCTED FOR CHEMICAL, PHYSICAL, AND BIOLOGICAL PARAMETERS. METHODS WOULD BE DEVELOPED TO ADEQUATELY PROCESS ALL TYPES OF SAMPLES ENCOUNTERED. THE UNSATURATED SOIL ZONE PERCOLATE WOULD BE EVALUATED FOR VIRUS TRANSPORT BY LYSIMETERS; THE SATURATED ZONE BY MONITORING WELLS. PROGRESS: TWO SITES HAVE BEEN SELECTED FOR STUDY. ONE OF THE SITES WAS SELECTED FOR INTENSE STUDY DUE TO THE FACT THAT IT HAS A RANGE OF SOIL TYPES AND WASTEWATER IRRIGATION HISTORY. ITS WASTEWATER TREATMENT AND SPRAY IRRIGATION SYSTEMS ARE NEW. THUS, 9 LYSIMETERS TO DEPTHS OF 4.5 FT. AND 6 MONITORING WELLS HAVE BEEN INSTALLED. BACKGROUND SAMPLING AND TREATMENT PLANT CHARACTERIZATION HAS BEEN COMPLETED. SAMPLING AND SAMPLE PROCESSING METHODOLOGY HAS BEEN MODIFIED TO FACILITATE HANDLING OF THE SAMPLES OBTAINED FROM BOTH SITES AND TO OPTIMIZE VIRUS RECOVERY.

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REACTIONS OF OXY RADICALS IN THE ATMOSPHERE

   START/ COMPL DATE :    06/77 - 06/78 : FUNDING : EST. - FY   77  / $   35000
    TASK/EPA CODE :G603A-AC-11  / R803846-03  (GRANT)  PRIOR  FY76 / $   220001
   PROJECT OFFICER : M    DODGE
   INVESTIGATORS :   D G HENDRY                        SRI INTERNATIONAL
                     R A KENLEY                        SRI INTERNATIONAL
   MILE: 12/78 -FINAL REPORT
     THE CURRENT STUDY OF THE REACTION OF OH WITH AROMATIC HYDROCARBONS
     INDICATES THAT IN THE URBAN ATMOSPHERE COMPOUNDS LIKE TOLUENE WILL BE CO
     NVERTED INITIALLY TO AROMATIC ALDEHYDES AND PHENOLIC COMPOUNDS. THEREFORE,
      THE OBJECTIVE OF THIS PROPOSED GRANT CONTINUATION IS TO STUDY THE
     REACTIONS OF THESE TYPES OF PRODUCTS WITH OH RADICAL AND OZONE IN ORDER TO
     DETERMINE THEIR FATE IN THE URBAN ATMOSPHERE. A SECONDARY OBJECTIVE IS TO
     EVALUATE THE RATE CONSTANTS FOR REACTIONS OF HO2 WITH SIMPLE OLEFINS
     SUCH AS ETHYLENE, PROPYLENE, AND ISOBUTYLENE.
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II-97

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REACTIONS OF OXY RADICALS IN THE ATMOSPHERE

    START/ COMPL DATE :    06/77 - 06/78 : FUNDING : EST. - FY   77  / $   80000
     TASK/EPA CODE :G603A-AE-04  / R803846-03  (GRANT)  PRIOR  FY76 / $  650001
    PROJECT OFFICER : M    DODGE
    INVESTIGATORS :    D G HENDRY                       SRI INTERNATIONAL
                       R A KENLEY                       SRI INTERNATIONAL
    MILE: 06/77 -FINAL REPORT
      THE CURRENT STUDY OF THE REACTION OF OH WITH AROMATIC HYDROCARBONS
      INDICATES THAT IN THE URBAN ATMOSPHERE COMPOUNDS LIKE TOLUENE WILL BE CO
      NVERTED INITIALLY TO AROMATIC ALDEHYDES AND PHENOLIC COMPOUNDS. THEREFORE,
       THE OBJECTIVE OF THIS PROPOSED GRANT CONTINUATION IS TO STUDY THE
      REACTIONS OF THESE TYPES OF PRODUCTS WITH OH RADICAL AND OZONE IN ORDER TO
      DETERMINE THEIR FATE IN THE URBAN ATMOSPHERE. A SECONDARY OBJECTIVE IS TO
      EVALUATE THE RATE CONSTANTS FOR REACTIONS OF HO2 WITH SIMPLE OLEFINS
      SUCH AS ETHYLENE, PROPYLENE, AND ISOBUTYLENE.
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FORMATION OF ATMOSPHERIC AEROSOLS

   START/ COMPL DATE :    07/75 - 07/78 : FUNDING : EST, - FY   77  / $      0
    TASK/EPA CODE :G601B-CA-01  / R803851-03  (GRANT)  PRIOR  FY76 / $   300001
   PROJECT OFFICER : W    WILSON
   INVESTIGATORS :    K T WHITBY                       UNIV, OF MINNESOTA
                      D B KITTELSON                    UNIV, OF MINNESOTA
                      B K CANTRELL                     UNIV, OF MINNESOTA
  MILE: 03/77 -FINAL REPORT
    AEROSOL SIZE DISTRIBUTIONS HAVE BEEN MEASURED IN THE ST, LOUIS AREA AS
    PART OF EPA'S PROJECT MISST USING AIRCRAFT AND GROUND-BASED SELF-CONTAINED
    MOBILE LABORATORIES, THESE MEASUREMENTS WERE MADE WITH A GROUP OF
    COLLABORATORS SUCH THAT A COMPLETE ARRAY OF CHEMICAL, PHYSICAL, AND METEOR
    OLOGICAL MEASUREMENTS WERE OBTAINED ON A COAL-FIRED POWER PLANT PLUME, THE
    UNIVERSITY OF MINNESOTA'S PORTION OF THE PROJECT INCLUDED AEROSOL MEASU
    REMENTS ABOARD AN AIRCRAFT AND THE OPERATION OF A MOBILE VAN ON THE GROUND
    UNDER THE PLUMES, THIS MOBILE VAN WAS ALSO OPERATED ON FREEWAYS IN THE LOS
    ANGELES AREA DURING OCTOBER 1976 AS PART OF AN EPA-SPONSORED PROJECT TO
    STUDY SULFUR AEROSOLS ON ROADWAYS, MUCH OF THE WORK DURING THE NEXT PROJEC
    T YEAR WILL BE ANALYSIS AND REPORTING OF THE LARGE AMOUNT OF DATA OBTAINED
     DURING THE PAST SEVERAL YEARS, ANALYSIS IS BEING DIRECTED TOWARD OBT
    AINING AEROSOL GROWTH RATES IN THE PLUMES, AEROSOL NUCLEATION RATES IN THE
    PLUMES AND SURROUNDING ATMOSPHERE, AND TOWARD BETTER DESCRIPTIONS OF THE
    AEROSOL SIZE DISTRIBUTIONS, LABORATORY WORK TOWARD THE DEVEL
    OPMENT OF A CONTINUOUS INSTRUMENT FOR THE MEASUREMENT OF AEROSOL SULFUR IS
    ALSO BEING PARTIALLY SUPPORTED BY THIS PROJECT,
FORMATION OF ATMOSPHERIC AEROSOLS

   START/ COMPL DATE :    07/75 - 07/78 : FUNDING : EST. - FY   77  / $   33000
    TASK/EPA CODE :G601B-CA-05   / R803851-03  (GRANT)  PRIOR  FY76 / $   200001
   PROJECT OFFICER : W    WILSON
   INVESTIGATORS :     K T WHITBY                      UNIV. OF MINNESOTA
                       D B KITTELSON                   UNIV. OF MINNESOTA
                       B K CANTRELL                    UNIV. OF MINNESOTA
   MILE: 09/77 -EVALUATIONS OF HIGHWAY MODEL
     AEROSOL SIZE DISTRIBUTIONS HAVE BEEN MEASURED IN THE ST. LOUIS AREA AS
     PART OF EPA'S PROJECT MISST USING AIRCRAFT AND GROUND-BASED SELF-CONTAINED
     MOBILE LABORATORIES. THESE MEASUREMENTS WERE MADE WITH A GROUP OF
     COLLABORATORS SUCH THAT A COMPLETE ARRAY OF CHEMICAL, PHYSICAL, AND METEOR
     OLOGICAL MEASUREMENTS WERE OBTAINED ON A COAL-FIRED POWER PLANT PLUME. THE
     UNIVERSITY OF MINNESOTA'S PORTION OF THE PROJECT INCLUDED AEROSOL MEASU
     REMENTS ABOARD AN AIRCRAFT AND THE OPERATION OF A MOBILE VAN ON THE GROUND
     UNDER THE PLUMES. THIS MOBILE VAN WAS ALSO OPERATED ON FREEWAYS IN THE LOS
     ANGELES AREA DURING OCTOBER 1976 AS PART OF AN EPA-SPONSORED PROJECT TO
     STUDY SULFUR AEROSOLS ON ROADWAYS. MUCH OF THE WORK DURING THE NEXT PROJEC
     T YEAR WILL BE ANALYSIS AND REPORTING OF THE LARGE AMOUNT OF DATA OBTAINED
      DURING THE PAST SEVERAL YEARS. ANALYSIS IS BEING DIRECTED TOWARD OBT
     AINING AEROSOL GROWTH RATES IN THE PLUMES, AEROSOL NUCLEATION RATES IN THE
     PLUMES AND SURROUNDING ATMOSPHERE, AND TOWARD BETTER DESCRIPTIONS OF THE
     AEROSOL SIZE DISTRIBUTIONS. LABORATORY WORK TOWARD THE DEVEL
     OPMENT OF A CONTINUOUS INSTRUMENT FOR THE MEASUREMENT OF AEROSOL SULFUR IS
     ALSO BEING PARTIALLY SUPPORTED BY THIS PROJECT.
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FORMATION OF ATMOSPHERIC AEROSOLS

START/ COMPL DATE : 07/75 - 07/78 : FUNDING : EST. - FY 77 / $ 25000
TASK/EPA CODE :G601B-CA-08 / R803851-03 (GRANT) PRIOR FY76 / $ 2530001
PROJECT OFFICER : W WILSON
INVESTIGATORS : K T WHITBY UNIV. OF MINNESOTA
D B KITTELSON UNIV. OF MINNESOTA
B K CANTRELL UNIV. OF MINNESOTA
MILE: 03/77 -DATA REPORT

AEROSOL SIZE DISTRIBUTIONS HAVE BEEN MEASURED IN THE ST. LOUIS AREA AS PART OF EPA'S PROJECT MISST USING AIRCRAFT AND GROUND-BASED SELF-CONTAINED MOBILE LABORATORIES. THESE MEASUREMENTS WERE MADE WITH A GROUP OF COLLABORATORS SUCH THAT A COMPLETE ARRAY OF CHEMICAL, PHYSICAL, AND METEOROLOGICAL MEASUREMENTS WERE OBTAINED ON A COAL-FIRED POWER PLANT PLUME. THE UNIVERSITY OF MINNESOTA'S PORTION OF THE PROJECT INCLUDED AEROSOL MEASUREMENTS ABOARD AN AIRCRAFT AND THE OPERATION OF A MOBILE VAN ON THE GROUND UNDER THE PLUMES. THIS MOBILE VAN WAS ALSO OPERATED ON FREEWAYS IN THE LOS ANGELES AREA DURING OCTOBER 1976 AS PART OF AN EPA-SPONSORED PROJECT TO STUDY SULFUR AEROSOLS ON ROADWAYS. MUCH OF THE WORK DURING THE NEXT PROJECT YEAR WILL BE ANALYSIS AND REPORTING OF THE LARGE AMOUNT OF DATA OBTAINED DURING THE PAST SEVERAL YEARS. ANALYSIS IS BEING DIRECTED TOWARD OBTAINING AEROSOL GROWTH RATES IN THE PLUMES, AEROSOL NUCLEATION RATES IN THE PLUMES AND SURROUNDING ATMOSPHERE, AND TOWARD BETTER DESCRIPTIONS OF THE AEROSOL SIZE DISTRIBUTIONS. LABORATORY WORK TOWARD THE DEVELOPMENT OF A CONTINUOUS INSTRUMENT FOR THE MEASUREMENT OF AEROSOL SULFUR IS ALSO BEING PARTIALLY SUPPORTED BY THIS PROJECT.

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FORMATION OF ATMOSPHERIC AEROSOLS

    START/ COMPL DATE :    05/77 - 04/78 : FUNDING : EST, - FY   77  / $  104000
     TASK/EPA CODE :G603A-AH-03  / R803851-03  (GRANT)  PRIOR  FY   /          1
    PROJECT OFFICER : W E  WILSON
    INVESTIGATORS :    K T WHITBY                      UNIV, OF MINNESOTA
                       D B KITTELSON                   UNIV, OF MINNESOTA
                       B K CANTRELL                    UNIV, OF MINNESOTA
    MILE: 04/79 -FINAL REPORT
      AEROSOL SIZE DISTRIBUTIONS HAVE BEEN MEASURED IN THE ST, LOUIS AREA AS
      PART OF EPA'S PROJECT MISST USING AIRCRAFT AND GROUND BASED SELF CONTAINED
      MOBILE LABORATORIES, THESE MEASUREMENTS WERE MADE WITH A GROUP OF
      COLLABORATORS SUCH THAT A COMPLETE ARRAY OF CHEMICAL, PHYSICAL, AND METEOR
      OLOGICAL MEASUREMENTS WERE OBTAINED ON A COAL FIRED POWER PLANT PLUME, THE
      UNIVERSITY OF MINNESOTA'S PORTION OF THE PROJECT INCLUDED AEROSOL MEASU
      REMENTS ABOARD AN AIRCRAFT AND THE OPERATION OF A MOBILE VAN ON THE GROUND
      UNDER THE PLUMES, THIS MOBILE VAN WAS ALSO OPERATED ON FREEWAYS IN THE LOS
      ANGELES AREA DURING OCTOBER 1976 AS PART OF AN EPA SPONSORED PROJECT TO
      STUDY SULFUR AEROSOLS ON ROADWAYS, MUCH OF THE WORK DURING THE NEXT PROJEC
      T YEAR WILL BE ANALYSIS AND REPORTING OF THE LARGE AMOUNT OF DATA OBTAINED
       DURING THE PAST SEVERAL YEARS, ANALYSIS IS BEING DIRECTED TOWARD OBT
      AINING AEROSOL GROWTH RATES IN THE PLUMES, AEROSOL NUCLEATION RATES IN THE
      PLUMES AND SURROUNDING ATMOSPHERE, AND TOWARD BETTER DESCRIPTIONS OF THE
      AEROSOL SIZE DISTRIBUTIONS, LABORATORY WORK TOWARD THE DEVEL
      OPMENT OF A CONTINUOUS INSTRUMENT FOR THE MEASUREMENT OF AEROSOL SULFUR IS
      ALSO BEING PARTIALLY SUPPORTED BY THIS PROJECT,
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FORMATION OF ATMOSPHERIC AEROSOLS

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START/ COMPL DATE :    07/75 - 07/78 : FUNDING : EST. - FY   77  / $  225000
 TASK/EPA CODE :G625B-EA-08  / R803851-03  (GRANT)  PRIOR  FY76 / $   740001
PROJECT OFFICER : W    WILSON
INVESTIGATORS :   K T WHITBY
                  D B KITTELSON                   UNIV. OF MINNESOTA
                  B K CANTRELL                    UNIV. OF MINNESOTA
MILE: 09/76 -FINAL REPORT                         UNIV. OF MINNESOTA
      12/77 -FINAL REPORT
      09/78 -FINAL REPORT
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AEROSOL SIZE DISTRIBUTIONS HAVE BEEN MEASURED IN THE ST. LOUIS AREA AS PART OF EPA'S PROJECT MISST USING AIRCRAFT AND GROUND BASED SELF CONTAINED MOBILE LABORATORIES. THESE MEASUREMENTS WERE MADE WITH A GROUP OF COLLABORATORS SUCH THAT A COMPLETE ARRAY OF CHEMICAL, PHYSICAL, AND METEOROLOGICAL MEASUREMENTS WERE OBTAINED ON A COAL FIRED POWER PLANT PLUME. THE UNIVERSITY OF MINNESOTA'S PORTION OF THE PROJECT INCLUDED AEROSOL MEASUREMENTS ABOARD AN AIRCRAFT AND THE OPERATION OF A MOBILE VAN ON THE GROUND UNDER THE PLUMES. THIS MOBILE VAN WAS ALSO OPERATED ON FREEWAYS IN THE LOS ANGELES AREA DURING OCTOBER 1976 AS PART OF AN EPA SPONSORED PROJECT TO STUDY SULFUR AEROSOLS ON ROADWAYS. MUCH OF THE WORK DURING THE NEXT PROJECT YEAR WILL BE ANALYSIS AND REPORTING OF THE LARGE AMOUNT OF DATA OBTAINED DURING THE PAST SEVERAL YEARS. ANALYSIS IS BEING DIRECTED TOWARD OBTAINING AEROSOL GROWTH RATES IN THE PLUMES, AEROSOL NUCLEATION RATES IN THE PLUMES AND SURROUNDING ATMOSPHERE, AND TOWARD BETTER DESCRIPTIONS OF THE AEROSOL SIZE DISTRIBUTIONS. LABORATORY WORK TOWARD THE DEVELOPMENT OF A CONTINUOUS INSTRUMENT FOR THE MEASUREMENT OF AEROSOL SULFUR IS ALSO BEING PARTIALLY SUPPORTED BY THIS PROJECT.

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EFFECTS OF THERMAL ADDITIONS ON THE DYNAMICS OF FOULING COMMUNITIES AT
BEAUFORT, NC
   START/ COMPL DATE :    12/75 - 12/78 : FUNDING : EST. - FY   77  / $   70000
    TASK/EPA CODE :P625A-01     / R803856-02  (GRANT)  PRIOR  FY75 / $   547021
   PROJECT OFFICER : D    MILLER
   INVESTIGATORS :    J P SUTHERLAND                DUKE UNIVERSITY
                      W W KIRBYSMITH                DUKE UNIVERSITY
   MILE: 12/78 -FINAL REPORT ENTITLED "EFFECTS OF THERMAL ADDITIONS ON THE DYNA
     CONSTRUCTION OF A LABORATORY SYSTEM WHICH WILL PROVIDE RUNNING SEAWATER AT
      AMBIENT TEMPERATURE AND AT 2 DEGREES C, 4 DEGREES C, AND 8 DEGREES C
     ABOVE AMBIENT, FOULING DEVELOPMENT AND CHANGES IN FOULING COMMUNITY STR
     UCTURE WILL BE FOLLOWED AT EACH TEMPERATURE FOR SEVERAL YEARS ON CLAY TILE
      PLATES (232 CM2) SUBMERGED IN OCTOBER 1975 AND APRIL 1976, LARVAL
     RECRUITMENT AT EACH TEMPERATURE WILL ALSO BE MONITORED, PARALLEL EXPER
     IMENTS WILL BE CONDUCTED SIMULTANEOUSLY ON PLATES SUBMERGED UNDER THE DUKE
     MARINE LAB DOCK, DATA WILL BE USED TO DETERMINE THE EFFECT OF HEATED
     EFFLUENTS ON COMMUNITY STRUCTURE AND FUNCTION,
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II-104

APPLICATION OF FOURIER TRANSFORM SPECTROSCOPY TO AIR POLLUTION PROBLEMS

START/ COMPL DATE :   07/77 - 07/78 : FUNDING : EST. - FY   77 / $ 95000
TASK/EPA CODE :G603A-AI-03 / R803868-03 (GRANT) PRIOR FY76 / $ 1450001
PROJECT OFFICER : J   SPENCE
INVESTIGATORS :   J H SHAW   OHIO STATE UNIVERSITY
                  J G CALVERT   OHIO STATE UNIVERSITY
MILE: 06/78 -FINAL REPORT

THE DEVELOPMENT OF INFRARED FOURIER TRANSFORM SPECTROSCOPIC TECHNIQUES TO CHARACTERIZE CERTAIN KEY AIR POLLUTANTS, THEIR PRECURSORS AND REACTION PRODUCTS AND TO ESTABLISH QUANTITATIVE KINETIC AND MECHANISTIC DETAILS OF THE INTERRELATIONSHIPS BETWEEN THESE POLLUTANTS BOTH IN SIMULATED AND REAL ATMOSPHERES IS THE PRIMARY OBJECTIVE OF THIS PROPOSED WORK. IN PARTICULAR, FTS TECHNIQUES WILL BE USED TO OBTAIN LONG PATH LENGTH ATMOSPHERIC SPECTRA TO AID IN THE IDENTIFICATION OF TRACE ATMOSPHERIC CONSTITUENTS, TO STUDY SOME ASPECTS OF THE NATURAL REMOVAL MECHANISMS OF FREONS FROM THE ATMOSPHERE AND OF THEIR INFLUENCE ON ATMOSPHERIC OZONE, AND TO STUDY SOME KEY REACTIONS OF IMPORTANCE IN PHOTOCHEMICAL SMOG FORMATION.

II-105

SEWAGE DISPOSAL BY EVAPORATION-TRANSPIRATION

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   START/ COMPL DATE :    07/75 - 12/77 : FUNDING : EST. - FY   77  / $    7000
    TASK/EPA CODE :C611B-7129    / R803871      (GRANT)  PRIOR  FY75 / $  458001
   PROJECT OFFICER : J F  KREISSL
   INVESTIGATORS :    E R BENNETT                      UNIV. OF COLORADO
                      K D LINSTEDT                     UNIV. OF COLORADO
   MILE: 07/75 -START
         11/77 -COMPLETE
         03/78 -PUBLISH
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PROPER DISPOSAL OF SEWAGE EFFLUENT FROM RURAL AND ISOLATED HOMES AND BUSINESSES IS ONE OF THE MOST DIFFICULT PROBLEMS FACING HEALTH AUTHORITIES. THIS IS PARTICULARLY TRUE IN AREAS WHERE SOIL CONDITIONS ARE UNSUITABLE FOR APPLICATION OF LEACHING FIELDS FOLLOWING SEPTIC TANKS. THESE CONDITIONS ARE IN MANY AREAS HAVING HIGH GROUND WATER TABLES AND IN OTHER AREAS WHERE BEDROCK IS CLOSE TO THE GROUND SURFACE. UNDER THESE CONDITIONS, AN EVAPORATION TYPE SYSTEM CONCEPT CAN BE USED TO DISPOSE OF THE WASTEWATER WITHOUT ADVERSE EFFECTS ON THE LAND OR GROUND WATER. THE OBJECTIVES OF THIS STUDY ARE TO DETERMINE RATIONAL DESIGN CRITERIA, ESTIMATED COSTS AND POTENTIAL APPLICABILITY OF EVAPOTRANSPIRATION (ET) AND MECHANICAL EVAPORATION (E) SYSTEMS FOR DISPOSAL OF WASTEWATER FROM INDIVIDUAL HOMES. SPECIFIC OBJECTIVES ARE THE QUANTIFICATION OF MAJOR DESIGN PARAMETERS, SUCH AS SOIL TYPE, SATURATED DEPTH AND VEGETATIVE COVER FOR ET SYSTEMS AND PHYSICAL AND MECHANICAL FACTORS FOR E SYSTEMS, BY THERMODYNAMIC STUDIES, PILOT STUDIES, AND IN THE CASE OF ET SYSTEMS, MONITORING OF EXISTING FULL-SCALE SYSTEMS. BY USE OF METEOROLOGIC AND HYDROLOGIC DATA FROM APPROXIMATELY FIVE LOCATIONS IN THE UNITED STATES, ESTIMATES OF COST AND APPLICABILITY OF THESE TYPES OF SYSTEMS WILL BE MADE FOR THESE LOCATIONS REPRESENTING A WIDE SPECTRUM OF CLIMATIC CONDITIONS.

EVALUATION OF FULL SCALE WASTEWATER REUSE SYSTEM FOR DOMESTIC GROUNDWATER REPLENISHMENT

START/ COMPL DATE : 09/75 - 08/78 : FUNDING : EST. - FY 77 / $ 55000
TASK/EPA CODE :C611B-7221 / S803873-01 (GRANT) PRIOR FY75 / $ 1450001
PROJECT OFFICER : J N ENGLISH
INVESTIGATORS : D ARGO — ORANGE CO. WATER DISTRICT
P L MCCARTY — STANFORD UNIVERSITY

MILE: 09/75 -PROJECT START
09/77 -INTERIM FUNDING
03/78 -INTERIM REPORT
08/78 -PROJECT COMPLETION
03/79 -FINAL REPORT PUBLISHED

THE OBJECTIVES OF THIS STUDY ARE TO EVALUATE ON A FULL PLANT-SCALE BASIS: (1) THE RELIABILITY AND EFFLUENT VARIABILITY OF A 15 MGD ADVANCED WASTEWATER TREATMENT (AWT) SYSTEM PRODUCING A WATER APPROACHING POTABLE QUALITY FOR USE IN GROUND WATER REPLENISHMENT AND PREVENTION OF SEAWATER INTRUSION, AND (2) THE QUALITY OF THE EFFLUENT WITH REGARD TO THE IDENTIFICATION, MEASUREMENT, AND MONITORING OF TRACE MATERIALS (CHEMICAL, PHYSICAL AND BIOLOGICAL) AND RESIDUES. PARTICULAR EMPHASIS WILL BE PLACED ON THE CHARACTERIZATION OF THE ORGANIC MATERIALS IN THE EFFLUENT USING THE LATEST GAS CHROMATOGRAPHIC/MASS SPECTROPHOTOMETRIC PROCEDURES. THE ANALYSES TO BE CONDUCTED ARE AS FOLLOWS: 1. GENERAL ORGANIC CHARACTERIZATION; A. VOLATILE ORGANIC ANALYSIS (VOA); B. SOLVENT EXTRACTABLE ANALYSIS (SEA); C. DETAILED CHARACTERIZATION (DC); 2. POLYCYCLIC AROMATIC HYDROCARBONS (PAH); 3. PESTICIDES; 4. POLYCHLORINATED BIPHENYLS (PCBS); 5. TRICHLOROBENZENE. THE AWT SYSTEM TREATS THE EFFLUENT FROM A TRICKLING FILTER PLANT USING LIME COAGULATION AND SEDIMENTATION, AMMONIA STRIPPING, RECARBONATION, FILTRATION, CARBON ADSORPTION, AND CHLORINATION. THIS EFFLUENT WILL BE BLENDED WITH DESALTED SEAWATER AND/OR A SUPPLY OF DEEP GROUNDWATER FOR INJECTION INTO A DOMESTIC AQUIFER.

II-107

MESOSCALE SULFUR BALANCE STUDIES

START/ COMPL DATE :   12/75 - 02/79 : FUNDING : EST, - FY   77 / $ 174000
TASK/EPA CODE :G603A-AH-12 / R803887-02 (GRANT) PRIOR FY   /   1
PROJECT OFFICER : W   WILSON
INVESTIGATORS :   J W WINCHESTER   STATE UNIVERSITY OF FLA. SYS.
J W NELSON   STATE UNIVERSITY OF FLA. SYS.
MILE: 12/80 -FINAL REPORT

A COMPREHENSIVE STUDY IS BEING CONDUCTED TO CHARACTERIZE THE OCCURRENCE OF SULFUR IN AEROSOL PARTICLES AT SAMPLING STATIONS IN 14 LOCATIONS BETWEEN THE MID-CONTINENT AND EASTERN SEABOARD OF CONTINENTAL U.S.A. ADDITIONAL REMOTE STATIONS IN MARINE AND CONTINENTAL AREAS ARE ALSO BEING OPERATED TO PROVIDE IMPORTANT BACKGROUND INFORMATION, EMPHASIS IS BEING PLACED ON THE CONCENTRATIONS OF SULFUR IN RELATION TO OTHER ELEMENTS PRESENT IN THE AEROSOL AND ON THE TIME VARIABILITY OF THESE CONCENTRATIONS WITH A TIME RESOLUTION OF 2 HOURS, SAMPLING IS BEING CARRIED OUT CONTINUOUSLY AT HEIGHTS FROM GROUND LEVEL TO 30 METERS BY A UNIQUE TIME SEQUENCE FILTER SAMPLER WHICH HAS BEEN DEVELOPED AT FLORIDA STATE UNIVERSITY, ADDITIONAL SAMPLES ARE PLANNED TO BE TAKEN DURING INTENSIVE PERIODS DURING THE YEAR BY CASCADE IMPACTORS AT ABOUT FIVE OF THE FILTER SAMPLING SITES, USING CASCADE IMPACTORS FUR DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF SULFUR AND RELATED ELEMENTS, ELEMENTAL ANALYSIS IS PERFORMED USING PROTON INDUCED X-RAY EMISSION, A HIGHLY SENSITIVE TECHNIQUE PERMITTING BOTH THE EXTREMELY SHORT 2-HOUR TIME RESOLUTION ON A CONTINUOUS BASIS FOR FILTER SAMPLES AS WELL AS THE SIZE RESOLUTION OF PARTICLES AS SMALL AS 0.25 MICRON DIAMETER BY CASCADE IMPACTORS, BY MEANS OF THE COMBINATION OF SAMPLING TECHNIQUES, THE IMPACT OF FOSSIL FUEL COMBUSTION AND OTHER ANTHROPOGENIC SOURCES OF SULFUR ON THE NATURAL CHARACTERISTICS OF THE ATMOSPHERE MAY BE PRECISELY DETERMINED,

MESOSCALE SULFUR BALANCE STUDIES

START/ COMPL DATE : 12/75 - 02/79 : FUNDING : EST. - FY 77 / $ 35000
TASK/EPA CODE :G625B-EA-14 / R803887-02 (GRANT) PRIOR FY / 1
PROJECT OFFICER : R PATTERSON
INVESTIGATORS : J W WINCHESTER STATE UNIVERSITY OF FLA. SYS.
J W NELSON STATE UNIVERSITY OF FLA. SYS.
MILE: 12/78 -FINAL REPORT

A COMPREHENSIVE STUDY IS BEING CONDUCTED TO CHARACTERIZE THE OCCURRENCE OF SULFUR IN AEROSOL PARTICLES AT SAMPLING STATIONS IN 14 LOCATIONS BETWEEN THE MID-CONTINENT AND EASTERN SEABOARD OF CONTINENTAL U.S.A. ADDITIONAL REMOTE STATIONS IN MARINE AND CONTINENTAL AREAS ARE ALSO BEING OPERATED TO PROVIDE IMPORTANT BACKGROUND INFORMATION. EMPHASIS IS BEING PLACED ON THE CONCENTRATIONS OF SULFUR IN RELATION TO OTHER ELEMENTS PRESENT IN THE AEROSOL AND ON THE TIME VARIABILITY OF THESE CONCENTRATIONS WITH A TIME RESOLUTION OF 2 HOURS. SAMPLING IS BEING CARRIED OUT CONTINUOUSLY AT HEIGHTS FROM GROUND LEVEL TO 30 METERS BY A UNIQUE TIME SEQUENCE FILTER SAMPLER WHICH HAS BEEN DEVELOPED AT FLORIDA STATE UNIVERSITY. ADDITIONAL SAMPLES ARE PLANNED TO BE TAKEN DURING INTENSIVE PERIODS DURING THE YEAR BY CASCADE IMPACTORS AT ABOUT FIVE OF THE FILTER SAMPLING SITES, USING CASCADE IMPACTORS FOR DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF SULFUR AND RELATED ELEMENTS. ELEMENTAL ANALYSIS IS PERFORMED USING PROTON INDUCED X-RAY EMISSION, A HIGHLY SENSITIVE TECHNIQUE PERMITTING BOTH THE EXTREMELY SHORT 2-HOUR TIME RESOLUTION ON A CONTINUOUS BASIS FOR FILTER SAMPLES AS WELL AS THE SIZE RESOLUTION OF PARTICLES AS SMALL AS 0.25 MICRON DIAMETER BY CASCADE IMPACTORS. BY MEANS OF THE COMBINATION OF SAMPLING TECHNIQUES, THE IMPACT OF FOSSIL FUEL COMBUSTION AND OTHER ANTHROPOGENIC SOURCES OF SULFUR ON THE NATURAL CHARACTERISTICS OF THE ATMOSPHERE MAY BE PRECISELY DETERMINED.

MESOSCALE SULFUR BALANCE STUDIES

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START/ COMPL DATE :    12/75 - 02/79 : FUNDING : EST, - FY   77  / $   25000
 TASK/EPA CODE :G7128-88-03  / R803887-02  (GRANT)  PRIOR  FY76 / $   320001
PROJECT OFFICER : R    PATTERSON
INVESTIGATORS :    J W WINCHESTER                  STATE UNIVERSITY OF FLA, SYS,
                   J W NELSON                      STATE UNIVERSITY OF FLA, SYS,
MILE: L2/77 -FINAL REPORT
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A COMPREHENSIVE STUDY IS BEING CONDUCTED TO CHARACTERIZE THE OCCURRENCE OF SULFUR IN AEROSOL PARTICLES AT SAMPLING STATIONS IN 14 LOCATIONS BETWEEN THE MID-CONTINENT AND EASTERN SEABOARD OF CONTINENTAL U.S.A. ADDITIONAL REMOTE STATIONS IN MARINE AND CONTINENTAL AREAS ARE ALSO BEING OPERATED TO PROVIDE IMPORTANT BACKGROUND INFORMATION, EMPHASIS IS BEING PLACED ON THE CONCENTRATIONS OF SULFUR IN RELATION TO OTHER ELEMENTS PRESENT IN THE AEROSOL AND ON THE TIME VARIABILITY OF THESE CONCENTRATIONS WITH A TIME RESOLUTION OF 2 HOURS, SAMPLING IS BEING CARRIED OUT CONTINUOUSLY AT HEIGHTS FROM GROUND LEVEL TO 30 METERS BY A UNIQUE TIME SEQUENCE FILTER SAMPLER WHICH HAS BEEN DEVELOPED AT FLORIDA STATE UNIVERSITY, ADDITIONAL SAMPLES ARE PLANNED TO BE TAKEN DURING INTENSIVE PERIODS DURING THE YEAR BY CASCADE IMPACTORS AT ABOUT FIVE OF THE FILTER SAMPLING SITES, USING CASCADE IMPACTORS FOR DETERMINATION OF THE PARTICLE SIZE DISTRIBUTION OF SULFUR AND RELATED ELEMENTS, ELEMENTAL ANALYSIS IS PERFORMED USING PROTON INDUCED X-RAY EMISSION, A HIGHLY SENSITIVE TECHNIQUE PERMITTING BOTH THE EXTREMELY SHORT 2-HOUR TIME RESOLUTION ON A CONTINUOUS BASIS FOR FILTER SAMPLES AS WELL AS THE SIZE RESOLUTION OF PARTICLES AS SMALL AS 0,25 MICRON DIAMETER BY CASCADE IMPACTORS, BY MEANS OF THE COMBINATION OF SAMPLING TECHNIQUES, THE IMPACT OF FOSSIL FUEL COMBUSTION AND OTHER ANTHROPOGENIC SOURCES OF SULFUR ON THE NATURAL CHARACTERISTICS OF THE ATMOSPHERE MAY BE PRECISELY DETERMINED,

II-110

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ISOLATION AND STUDY OF CHLORO-ORGANICS RESULTING FROM CHLORINATION OF
SEAWATER
   START/ COMPL DATE :    07/75 - 05/79 : FUNDING : EST, - FY   77  / $  230000
    TASK/EPA CODE :Q625A-1-01    / R803893-03  (GRANT)  PRIOR  FY76 / $  3500001
   PROJECT OFFICER : W P  DAVIS
   INVESTIGATORS :    J H CARPENTER                      UNIV, OF MIAMI
                      C A SMITH                          UNIV, OF MIAMI
   MILE: 05/79 -FINAL REPORT
     THE PROPOSED RESEARCH SEEKS TO IDENTIFY THE CHLORINE-CONTAINING AND
     BROMINE-CONTAINING ORGANIC COMPOUNDS THAT ARE FORMED WHEN CHLORINE IS
     ADDED TO SEAWATER, INITIAL EMPHASIS WOULD BE PLACED ON STUDY OF REACTION
     CONDITIONS THAT OCCUR DURING POWER PLANT OPERATION; I.E., UP TO 2 HOURS AT
      TEMPERATURES UP TO 38 DEGREES C WITH AND WITHOUT SUNLIGHT, TOTAL
     ORGANIC HALOGENATED COMPOUNDS YIELD WOULD BE MEASURED, THE REACTION
     PRODUCTS WOULD BE FRACTIONATED, USING SELECTIVE SOLUBILITY AND THIN LAYER
     CHROMATOGRAPHY, CHARACTERIZATION WOULD BE CARRIED OUT USING GAS CHROMAT
     OGRAPHIC-MASS SPECTRAL TECHNIQUES AND ADDITIONAL CHARACTERIZATION WOULD BE
     BASED ON UV AND IR SPECTRA WITH NMR FOR SPECIAL CASES,
SULFUR BUDGET IN LARGE PLUMES

   START/ COMPL DATE :    04/77 - 03/78 : FUNDING : EST. - FY   77  / $  247000
    TASK/EPA CODE :G625B-EA-06  / R803896-02  (GRANT)  PRIOR  FY76 / $  2260001
   PROJECT OFFICER : W E  WILSON
   INVESTIGATORS :   R B HUSAR                      WASHINGTON UNIVERSITY
                     N V GILLANI                    WASHINGTON UNIVERSITY
                     J D HUSAR                      WASHINGTON UNIVERSITY
   MILE: 09/76 -FINAL REPORT
         12/77 -FINAL REPORT
         09/78 -FINAL REPORT
    THE OBJECTIVE OF THIS PROGRAM AS A PART OF PROJECT MISTT (MIDWEST INTE
    RSTATE SULFUR TRANSFORMATION AND TRANSPORT) IS THE QUANTITATIVE DETERMINAT
    ION OF THE FATE OF ATMOSPHERIC SULFUR, I.E., THE RATE OF SULFATE FORMATION
    AND THE RATE OF SO2 REMOVAL TO THE GROUND. LARGE PLUMES EMITTED FROM THE
     ELEVATED (POWER PLANT) AND LOW LEVEL SOURCES (URBAN) WERE STUDIED ON
    THE REGIONAL SCALE. AIRBORNE MEASUREMENTS IN THE PLUMES AND BACKGROUND
    AIR OUTSIDE THE PLUME WERE CARRIED OUT FOR SO2 O3 NOX, BSCAT, AEROSOL
    CHARGE, PARTICULATE SULFUR CONCENTRATION AND SUPPORTED BY EXTENSIVE
    METEOROLOGICAL MEASUREMENTS. SULFUR BUDGETS OF WELL DEFINED PLUMES WERE A
    SSESSED. TRANSPORT OF POLLUTANTS IN PLUMES WAS CHARACTERIZED IN TERMS OF H
    ORIZONTAL "LONG RANGE TRANSPORT" AND VERTICAL TRANSPORT. THE IMPORTANCE OF
     DRY REMOVAL FOR DIFFERENT TYPES OF PLUMES AND METEOROLOGICAL CONDITIONS
    WAS ASSESSED. SO2 TO PARTICULATE SULFATE CONVERSION RATES WERE DETERMINED
    FOR THE COAL-FIRED LABADIE POWER PLANT PLUME AND THE DIURNAL VARIABILITY
    (1-4 PERCENT PER HOUR FOR NOON HOURS AND 0.5 PERCENT PER HOUR FOR NIGHT
    HOURS) WAS DETERMINED.
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SULFUR BUDGET IN LARGE PLUMES

    START/ COMPL DATE :    07/75 = 07/78 : FUNDING : EST. = FY   77  / $   15000
     TASK/EPA CODE :G603A=AG=17  / R803896=0286(GRANT)  PRIOR  FY    /         1
    PROJECT OFFICER : W    WILSON
    INVESTIGATORS :   R B HUSAR                       WASHINGTON UNIVERSITY
    MILE: 09/78 =RPT. ON RELATIONSHIP BETWEEN VISIBILITY AND POLLUTANT CONC.
      THE THREE MAIN OBJECTIVES OF THIS STUDY ARE: 1) ESTABLISH AND DOCUMENT BY
      FIELD MEASUREMENTS THE SULFUR BUDGET IN LARGE SINGLE PLUMES, 2)
      IDENTIFY THE MAJOR PHYSICAL AND CHEMICAL MECHANISMS AND PARAMETERS WHICH
      GOVERN THE SULFUR BUDGET, 3) FORMULATE AND TEST A
       DISPERSION=TRANSFORMATION=REMOVAL MODEL FOR SO2 AND AEROSOL.
      INSTRUMENTED AIRCRAFT AND SURFACE VEHICLES WILL BE USED FOR THE DETAILED P
      LUME MAPPING OF FIXED DISTANCES FROM THE SOURCE OUTWARD TO 100 KM. USING W
      IND FIELD DATA FROM PILOT BALLOON MEASUREMENTS, THE HORIZONTAL SULFUR FLUX
      WILL BE MEASURED IN THE GAS AND AEROSOL PHASE. THE AEROSOL MASS AND
      SULFUR CONTENT WILL BE MEASURED BY A HIGH RESOLUTION BETA=GAUGE AND VAPORI
      ZATION=FLAME PHOTOMETRIC METHOD, RESPECTIVELY. THESE DATA WILL BE UTILIZED
      TO ESTABLISH THE AMOUNTS OF SO2 CONVERTED TO AEROSOL AND ITS RATE AND THE
      AMOUNT OF SULFUR REMOVED BY DRY DEPOSITION. THE DATA WILL BE USED FOR
      THE IMPROVEMENTS AND EXTENSION OF DISPERSION=TRANSFORMATION=REMOVAL
      MODELS.
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A FACILITY FOR THE EXPERIMENTAL ANALYSIS OF COASTAL MARINE ECOSYSTEMS

   START/ COMPL DATE :    07/77 - 06/78 : FUNDING : EST. - FY   77  / $  980000
    TASK/EPA CODE :P625A-07     / R803902-03  (GRANT)  PRIOR  FY76 / $ 19609551
   PROJECT OFFICER : E D  SCHNEIDER
   INVESTIGATORS :    J A KNAUSS                        UNIV. OF RHODE ISLAND
                      S   NIXON                         UNIV. OF RHODE ISLAND
                      M   PILSON                        UNIV. OF RHODE ISLAND
                      T   SMAYDA                        UNIV. OF RHODE ISLAND
   MILE: 06/78 -FINAL REPORT ENTITLED "A FACILITY FOR THE EXPERIMENTAL ANALYSIS
     OBJECTIVES: A) TO DEVELOP A FACILITY AND METHODOLOGY FOR THE EXPERIMENTAL
     ANALYSIS OF COASTAL MARINE ECOSYSTEMS AND THEIR RESPONSE TO ENERGY-RELATED
      ENVIRONMENTAL STRESSES B) TO RELATE THE EXPERIMENTAL RESULTS
     TO ECOSYSTEM THEORY AND ITS IMPLICATIONS FOR THE MANAGEMENT OF COASTAL M
     ARINE ENVIRONMENTS. APPROACH: REPLICATE MESO-SCALE EXPERIMENTAL ECOSYSTEMS
     SIMULATING A VARIETY OF COMMON COASTAL MARINE ENVIRONMENTS WILL BE DEVEL
     OPED AND MAINTAINED AT A SPECIAL SHORE-BASED LABORATORY. A NUMBER OF STRES
     SES OR ENVIRONMENTAL PERTURBATIONS ASSOCIATED WITH ENERGY DEVELOPMENT WILL
     THEN BE APPLIED OVER A RANGE OF INTENSITIES TO THESE SYSTEMS BEFORE,
     DURING, AND AFTER THE APPLICATION OF STRESS. SIMILAR FIELD EXPERIMENTS MAY
     ALSO BE CARRIED OUT ON A SMALL SCALE IN SOME ENVIRONMENTS. CURRENT PLAN
     S: THE FIRST PROJECT WILL INVOLVE 9 SHORE-BASED EXPERIMENTAL WATER COLUMNS
     (5M DEEP X 2M DIA.) WITH ASSOCIATED BOTTOM SEDIMENTS AND BENTHOS. THE
     MICROCOSMS WILL FIRST BE STUDIED FOR REPLICABILITY AND FOR DIFFERENCES
     BETWEEN TANKS THAT ARE RUN AS OPEN OR CLOSED SYSTEMS WITH RESPECT TO
     SEA-WATER FLOW. AFTER THIS PRELIMINARY WORK IS COMPLETED, A SERIES OF EXP
     ERIMENTS INVOLVING THE ADDITION OF WATER SOLUBLE PETROLEUM HYDROCARBONS AT
     CONCENTRATIONS OF 100 AND 1000 UG/1 WILL BEGIN.
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EVALUATION OF AMES' WASTE PROCESS - AN ENERGY RECOVERY SYSTEM

   START/ COMPL DATE :    02/76 - 02/79 : FUNDING : EST. - FY   77  / $  250000
    TASK/EPA CODE :B624B-391     / R803903     (GRANT)  PRIOR  FY76 / $  4640001
   PROJECT OFFICER : C    WILES
   INVESTIGATORS :    A O CHANTLAND
                      L J SHANNON                      AMES CITY GOVERNMENT
                      A W JOENSEN                      MIDWEST RESEARCH INSTITUTE
                      E R BAUMAN                       IOWA STATE UNIV. OF SC. & TEC
   MILE: 04/77 -FUNDING PACKAGE SUBMITTED              IOWA STATE UNIV. OF SC. & TEC
         05/77 -AWARD FUNDS FOR PROJECT
         01/77 -FUNDING INCREMENT
         04/77 -GRANT AMENDMENT
         02/78 -FINAL REPORT RECEIVED
    THE STUDY WILL ASSESS THE EFFECTS OF USING MUNICIPAL SOLID WASTE (MSW) AS
    A SUPPLEMENTARY FUEL. CO-FIRING OF MSW WITH COAL IN STOKER AND TANGEN
    TIALLY-FIRED BOILERS WILL BE CONDUCTED AND SINCE ONE BOILER IS THE SAME AS
     AT ST. LOUIS, STUDIES WILL PERMIT CONFIRMATION, AND COMPARISON OF
    SELECTED ST. LOUIS RESULTS. ASSESSMENTS WILL BE MADE OF THE TECHNICAL AND
    ENVIRONMENTAL ASPECTS OF THESE CO-FIRING TECHNIQUES. IN ADDITION, TE
    CHNICAL AND ECONOMIC TESTS AND EVALUATIONS WILL BE CONDUCTED ON THE SECOND
    GENERATION MSW PROCESSING FACILITY ASSOCIATED WITH SUPPLYING THE REFUSE
    DERIVED FUEL.
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DEMONSTRATION OF UNCOVERED REACTOR, FINE BUBBLE OXYGEN - ACTIVATED
SLUDGE SYSTEM
   START/ COMPL DATE :    08/75 - 03/78 : FUNDING : EST, - FY   77  / $   35000
    TASK/EPA CODE :C611B-7051   / 8803910     (GRANT)  PRIOR  FY75 / $  2000001
   PROJECT OFFICER : R C  BRENNER
   INVESTIGATORS :    J L PUNTENNEY                  METROP, DENVER SEW, DISP, DIS
                      J L PUNTENNEY                  F M C CORPORATION
                      S   PEARLMAN                   METROP, DENVER SEW, DISP, DIS
   MILE: 08/75 -GRANT AWARDED
         02/76 -CONSTRUCTION COMPLETED
         04/76 -SYSTEM DEBUGGING COMPLETED
         09/77 -EXPERIMENTAL EVALUATION COMPLETED
         03/78 -FINAL REPORT COMPLETED
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THE OBJECTIVES OF THIS PROJECT WERE: 1) TO CONVERT A THREE-PASS DIFFUSED AIR SYSTEM TO A SINGLE-PASS, UNCOVERED REACTOR, PURE OXYGEN ACTIVATED SLUDGE SYSTEM, 2) TO EVALUATE THE PERFORMANCE OF THE PURE OXYGEN SYSTEM AT VARYING FOOD TO MICROORGANISM RATIOS, DETENTION TIMES, AMBIENT TEMPERATURES, AND DIURNAL FLOW CONDITIONS, 3) TO DETERMINE DESIGN CRITERIA FOR A FULL PLANT CONVERSION OF THE EXISTING SECONDARY SYSTEM TO AN UNCOVERED REACTOR PURE OXYGEN SYSTEM, AS THEY RELATE TO OXYGEN UTILIZATION EFFICIENT, SOLIDS SETTLING CHARACTERISTICS, POWER REQUIREMENTS FOR OXYGEN DISSOLUTION, AND RELIABILITY OF OXYGEN DIFFUSION AND CONTROL EQUIPMENT, 4) TO DEMONSTRATE THE FEASIBILITY OF USING THIS TECHNOLOGY AT OTHER OVERLOADED ACTIVATED SLUDGE PLANTS THAT COULD BENEFIT FROM UPGRADING OF EXISTING TANKAGE AND FACILITIES, THE DEMONSTRATION SYSTEM WAS OPERATED FROM MAY 1976 TO SEPTEMBER 1977 AT INFLUENT FLOWS VARYING FROM 6 TO 18 MGD, MAJOR OPERATING DIFFICULTIES WERE ENCOUNTERED DURING THE 1976 AUTUMN, 1976-1977 WINTER, AND EARLY SPRING 1977 SEASONS DUE TO SEVERE INFESTATION OF FILAMENTOUS ORGANISMS, DURING PERIODS WHEN FILAMENTOUS GROWTHS WERE NOT EXCESSIVE, SATISFACTORY SYSTEM PERFORMANCE WAS OBSERVED AT NOMINAL AERATION DETENTION TIMES DOWN TO SLIGHTLY LESS THAN ONE HOUR,

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TOXAPHENE COMPOSITION AND TOXICOLOGY

START/ COMPL DATE : 01/75 - 12/78 : FUNDING : EST. - FY 77 / $ 45000
TASK/EPA CODE :H615F-7624 / R803913-03 (GRANT) PRIOR FY76 / $ 450001
PROJECT OFFICER : R L BARON
INVESTIGATORS : J E CASIDA UNIV. OF CALIFORNIA
M SALEH UNIV. OF CALIFORNIA
MILE: 00/77 -COMPARE TOXAPHENE PRODUCTS FOR UNIFORMITY AS MANUFACTURED FROM
00/78 -COMPARE TOXAPHENE FROM VARIOUS NATIONAL SOURCES
00/78 -FINAL REPORT

THE OBJECTIVES ARE TO DEFINE THE COMPOSITION AND TOXICOLOGY OF TOXAPHENE, THE INSECTICIDE USED IN LARGEST AMOUNTS IN THE UNITED STATES. AN IMPROVED ANALYTICAL METHOD BY OPEN TUBULAR COLUMN GAS CHROMATOGRAPHY ASSISTED IN ESTABLISHING THE COMPARATIVE COMPOSITION OF 21 SAMPLES OF TOXAPHENE AND RELATED CHLORINATED TERPENES INCLUDING THE SAMPLE EMPLOYED FOR TESTS IN MAMMALS FOR POTENTIAL CARCINOGENIC ACTIVITY. INDIVIDUAL TOXAPHENE COMPONENTS ARE NEEDED FOR USE IN METABOLISM AND ENVIRONMENTAL CHEMISTRY STUDIES AND TO ESTABLISH STRUCTURE-TOXICITY RELATIONSHIPS. THESE CAN NOW BE OBTAINED BY NEW PREPARATION METHODS TO THAT YIELD COMPOUNDS ACCOUNTING FOR 20-25% OF THE COMPOSITION OF TOXAPHENE. THUS, CHLORINATION OF 2-EXO,10-DICHLOROBORNANE PROVIDES A CONVENIENT SOURCE OF 2,2,5-ENDO,6-EXO,8,9,10-HEPTACHLOROBORNANE (B) WHICH ON FURTHER CHLORINATION GIVES THE 3-EXO-CHLORO,5-EXO-CHLORO-, 8-CHLORO-, 9-CHLORO-, AND 10-CHLORO-DERIVATIVES PLUS TWO NONECHLOROBORNANES. BIOASSAYS IN PROGRESS SUGGEST THAT THE TOXICITY TO MICE, HOUSEFLIES AND GOLDFISH DECREASES ON INTRODUCING CHLORINE SUBSTITUENTS INTO B IN THE ORDER 9-CHLORO GREATER THAN 8-CHLORO GREATER THAN NO ADDED CHLORINE GREATER THAN 3-EXO-CHLORO GREATER THAN 10-CHLORO. PRELIMINARY STUDIES INDICATE THAT B IS RAPIDLY AND EXTENSIVELY METABOLIZED IN RATS, REDUCED PORPHYRIN SYSTEMS AND IN BOVINE RUMEN FLUID TO TWO MAJOR PRODUCTS. THE METABOLISM AND ENVIRONMENTAL CHEMISTRY OF B AND RELATED CHLOROBORNANES WILL BE EMP

METABOLISM AND TOXIC EFFECTS OF DITHIOCARBAMATE FUNGICIDES IN THE RAT

START/ COMPL DATE : 01/75 - 12/78 : FUNDING : EST. - FY 77 / $ 48600
TASK/EPA CODE :H615F-7626 / R803914-03 (GRANT) PRIOR FY76 / $ 467181
PROJECT OFFICER : R L BARON
INVESTIGATORS : R A NEAL VANDERBILT UNIVERSITY
T YOSHIDA VANDERBILT UNIVERSITY
MILE: 00/77 -DETERMINE METABOLIC FATE OF ETU IN MAMMALS
00/78 -EFFECT OF ETM ON MFO ENZYME SYSTEMS
00/78 -METABOLIC FATE OF ETM IN MAMMALS

THIS PROJECT DEALS WITH THE MAMMALIAN (RATS, MICE) METABOLISM OF REPRESENTATIVE ETHYLENE-BISDITHIOCARBAMATE (EBDC) FUNGICIDES AND THEN MAJOR BREAKDOWN PRODUCTS ETHYLENETHIURAM MONOSULFIDE (ETM), ETHYLENE THIOUREA (ETU) AND ETHYLENE UREA (EU), IN ADDITION, THE ABILITY OF THE EBDC FUNGICIDES AND THEIR METABOLITES TO INHIBIT MAMMALIAN MONOOXYGENASE SYSTEMS IN LIVER AND TESTES WILL BE EXAMINED.

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ALASKAN OIL SEEPS - THEIR CHEMICAL AND BIOLOGICAL EFFECTS ON THE
ENVIRONMENT
   START/ COMPL DATE :    06/75 - 05/78 : FUNDING : EST. - FY  77  / $  123991
    TASK/EPA CODE :M625A-003    / R803922-03  (GRANT)  PRIOR  FY76 / $  2535231
   PROJECT OFFICER : F B  LOTSPEICH
   INVESTIGATORS :    D G SHAW
   MILE: 05/78 -FINAL REPORT                          UNIV. OF ALASKA
     OBJECTIVE IS TO RELATE A DEFINED CHRONIC INPUT OF PETROLEUM IN AN
     INTERTIDAL ENVIRONMENTAL TO BIOLOGICAL CHANGES AT THE ORGANISM AND CO
     MMUNITY LEVELS. THE PROJECT WILL INVESTIGATE OIL SEEPS ALONG THE GULF OF A
     LASKA THAT PROVIDE LONG-TERM, LOW-LEVEL INPUT OF PETROLEUM INTO THE MARINE
      INTERTIDAL ENVIRONMENT.
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A. The overall objective of the project is to demonstrate the effectiveness of a physical-chemical and biological liquid waste treatment plant in treating leachate collected from a land solid waste disposal site. Associated with the overall objective, alternative treatment sequences will be evaluated with regard to technical effectiveness and economics of operation.

B. The specific objectives of this project will be met by two actions. First, the treatment plant will be operated in five (5) modes: 1. Chemical-Physical Treatment followed by an Aerobic Biological Treatment, 2. Chemical-Physical Treatment, 3. Aerobic Biological Treatment, 4. Aerobic Biological Treatment followed by Chemical-Physical Treatment, 5. Activated Carbon Treatment.

Second, bench scale testing will be performed to evaluate chemical dosage and other plant operating procedures, such as sludge return and air rates. The bench scale tests will be performed both on a research scale plant (20 gallons/day) and a batch process. Different organic loadings as well as chemical dosages will be examined. These bench scale tests will be included in the daily work load of the chemist-operator. This will enable potentially desirable process modifications to be studied on a full-scale plant with minimum upset to the plant.

During these bench scale tests, as well as full-scale plant operation, complete documentation of test procedures, chemical dosage, retention time, and result will be generated. Complete documentation will also be provided on daily operatior and plant modifications including startup, operation, maintenance, problems, problem resolution, costs and performance.

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EVALUATION OF HIGH-RATE INFILTRATION-PERCOLATION BIDS TO IMPROVE WATER
QUALITY
   START/ COMPL DATE :    08/77 - 07/78 : FUNDING : EST, - FY   77  / $   41304
    TASK/EPA CODE :L611C-52      / R803931      (GRANT)  PRIOR  FY76 / $  1269861
   PROJECT OFFICER : L E  LEACH
   INVESTIGATORS :   D G SMITH                        BOULDER CITY GOVERNMENT
                     K D LINSTEDT                     UNIV, OF COLORADO
                     E R BENNETT                      UNIV, OF COLORADO
   MILE: 08/75 -PROJECT INITIATED
         08/76 -INTERIM REPORT
         07/77 -SPECIFIC DESIGN DATA FOR BOULDER & SIMILAR SITUATIONS
         10/78 -FINAL REPORT-3 YEARS DATA FOR TECHNICAL DESIGN BULLETINS
    THIS PROJECT INVOLVES THE OPERATION AND MONITORING OF THREE INFILT
    RATION-PERCOLATION BASINS OF VARYING AREAS LESS THAN ONE ACRE, SECONDARY E
    FFLUENT FROM A MUNICIPAL WASTEWATER TREATMENT PLANT IS APPLIED AT LOADINGS
    OF 100 ACRE-FEET/ACRE/YEAR TO 200 ACRE-FEET/ACRE/YEAR, THE ANALYSIS OF
    WATER QUALITY AND THE VARIOUS OPERATIONAL MODES AVAILABLE AND THEIR EFFECT
    ON WATER QUALITY IS THE MAIN EMPHASIS OF THE PROJECT,
CONTINUOUS FLOW BIOASSAYS USING NATURAL PERIPHYTON COMMUNITIES WITH
EMPHASIS ON THE EFFECTS OF COAL LEACHATE
   START/ COMPL DATE :    07/75 - 07/78 : FUNDING : EST. - FY   77  / $   55369
    TASK/EPA CODE :N625A-079    / R803932-03  (GRANT)  PRIOR  FY76 / $   550001
   PROJECT OFFICER : W    MILLER
   INVESTIGATORS :    D Z GERHART                     UNIV. OF MINNESOTA
                      L L HOLMETRAND                  UNIV. OF MINNESOTA
                      T J WOOD                        UNIV. OF MINNESOTA
                      J R RICHTER                     UNIV. OF MINNESOTA
   MILE: 01/76 -QUANTIFIED EFFECTS OF COAL LEACHATE ON PERIPHYTON COMMUNITIES
         06/76 -IDENTIFIED STIMULARY AND INHIBITORY LEACHATE COMPONENTS
         05/78 -IDENTIFY SYNERGISTIC OR AGNOSTIC LEACHATE INTERACTIONS
    OBJECTIVE OF THIS PROJECT ARE: 1) TO QUANTIFY THE EFFECTS OF COAL LEACHATE
     ON SPECIES COMPOSITION AND STRUCTURES OF PERIPHYTON COMMUNITIES; 2) TO
     IDENTIFY LEACHATE COMPONENTS WITH INHIBITORY OR STIMULATOR EFFECTS;
    3) TO ELUCIDATE POSSIBLE SYNERGISTIC OR ANTAGONISTIC INTERACTIONS AMONG
     LEACHATE COMPONENTS. APPROACH: PERIPHYTON COMMUNITIES ARE GROWN IN L
    ABORATORY STREAMS ON ARTIFICIAL SUBSTRATES. THE BIOASSAY FACILITY UTILIZES
    WATER FROM LAKE SUPERIOR AND IS LOCATED AT THE EPA'S NATIONAL ENVIRON
    MENTAL RESEARCH LABORATORY IN DULUTH, MINNESOTA. IN EXPERIMENTS WHICH LAST
    FROM 3 TO 8 WEEKS, PERIPHYTON COMMUNITIES ARE DOSED WITH VARIOUS C
    ONCENTRATIONS OF COAL LEACHARE, COAL DISTILLATE, OR FRACTIONS THEREOF, AND
    GROWTH RESPONSE IS MEASURED AS CHANGES IN BIOMASS (CHLOROPHYLL
    AND ASH-FREE DRY WEIGHT). ALGAL COMMUNITIES ARE ALSO EXAMINED MICRO
    SCOPICALLY TO DETECT CHANGES IN SPECIES COMPOSITION AND DIVERSITY. CURRENT
    PLANS AND PROGRESS: COAL LEACHATE APPEARS TO STIMULATE THE GROWTH OF
    ALGAE. CURRENT EFFORTS ARE FOCUSING ON IDENTIFYING THE SPECIFIC CHEMICAL
    FACTORS RESPONSIBLE FOR THIS EFFECT.
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ASSESSMENT OF THE EFFECTS OF BOTTOM DISTURBANCE ON THE ENVIRONMENT OF A
CLEAR SUBARCTIC STREAM
   START/ COMPL DATE :    07/75 - 07/78 : FUNDING : EST. - FY   77  / $   33238
    TASK/EPA CODE :M625A-004    / R803945-03  (GRANT)  PRIOR  FY76 / $   973471
   PROJECT OFFICER : E W  SCHALLOCK
   INVESTIGATORS :   J E MORROW                        UNIV. OF ALASKA
   MILE: 07/78 -FINAL REPORT
     THE EFFECTS OF A BURIED PIPELINE CROSSING IN THE CHATANIKA RIVER ARE BEING
      MONITORED. PARAMETERS CONSIDERED ARE 10 TYPE AND RATE OF FLOW; 2)
     OXYGEN AND CARBON DIOXIDE CONTENT OF WATER; 3) WATER TEMPERATURE; 4) SIZE
     TYPE AND DISTRIBUTION OF STREAM BOTTOM PARTICLES; 5) INTRA-GRAVEL WATER
     FLOW AND CHEMISTRY; 6) QUANTITY AND DIVERSITY OF ANIMAL AND PLANT
     ORGANISMS; 7) ORGANIC DRIFT; 8) PRIMARY PRODUCTIVITY. ITEMS 1) THROUGH 5)
     ARE HANDLED BY PERSONNEL OF THE ARCTIC ENVIRONMENTAL RESEARCH LABOR
     ATORY, EPA. RESULTS THUS FAR INDICATE SOME SILTATION DOWNSTREAM FROM THE C
     ROSSING; LOSS OF SMALL SPAWNING GROUND FOR LONGNOSE SUCKER DOWNSTREAM FROM
      THE CROSSING; SOME INCREASE IN ORGANIC DRIFT; TEMPORARY INCREASE IN
     PRIMARY PRODUCTIVITY BELOW AS COMPARED WITH ABOVE THE CROSSING. IT
     IS PLANNED TO MONITOR THESE FACTORS FOR ANOTHER YEAR TO DETERMINE WHETHER
     THE OBSERVED EFFECTS ARE PERMANENT OR TEMPORARY.
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EFFECTS OF NON-GASEOUS AIRBORNE POLLUTANTS FROM COAL-FIRED POWER PLANTS
ON PLANT GROWTH AND METABOLISM
   START/ COMPL DATE :    07/75 - 10/77 : FUNDING : EST. - FY   77  / $   92440
    TASK/EPA CODE :M625A-005    / R803948-02  (GRANT)  PRIOR  FY76 / $   709901
   PROJECT OFFICER : E    PRESTON
   INVESTIGATORS :    E R LANDA                        OREGON STATE HIGHER EDUC. SYS
   MILE: 10/77 -FINAL REPORT
     INVESTIGATE RELECTED EFFECTS OF STACK EMISSIONS ASSOCIATED WITH
     COAL-BURNING ON PLANT GROWTH AND METABOLISM.
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TOXIC EFFECTS ON THE AQUATIC BIOTA FROM COAL AND OIL SHALE DEVELOPMENT

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START/ COMPL DATE :    07/75 - 06/78 : FUNDING : EST. - FY   77  / $  444640
 TASK/EPA CODE :N644A-080    / R803950-03  (GRANT)  PRIOR  FY76 / $  5700001
PROJECT OFFICER : D I  MOUNT
INVESTIGATORS :    R V THURSTON                      COLORADO STATE UNIVERSITY
                   R V THURSTON                      MONTANA STATE UNIVERSITY
MILE: 08/77 -COMPLETE FIVE REPORTS ON COAL STRIPMINING EFFECTS ON CHEMISTRY
      09/77 -REPORTS ON BIOLOGICAL AND CHEMICAL EFFECTS ON COAL COMBUSTION
      09/77 -REPORTS ON BASELINE STUDIES FOR OIL SHALE EXTRACTION
      01/78 -SYNTHESIS REPORT ON AQUATIC EFFECTS OF COAL STRIPPING
      01/78 -SYNTHESIS REPORT ON AQUATIC EFFECTS OF COAL COMBUSTION
      01/78 -PRELIMINARY REPORTS ON TOXICITY AND ANALYSES OF COAL GASSIFICAT
      12/78 -COMPLETION REPORTS ON AQUATIC EFFECTS OF COAL MINING AND COMBUS
  THE OVERALL OBJECTIVE OF THIS RESEARCH PROJECT IS TO PROVIDE PREDICTIVE
  INFORMATION WITH REGARD TO POTENTIAL TOXICANTS TO THE AQUATIC ENVIRONMENT
  RESULTING FROM COAL AND OIL SHALE EXTRACTION AND CONVERSION. THE S
  PECIFIC OBJECTIVES ARE TO IDENTIFY AND QUANTIFY THOSE CHEMICAL PRODUCTS OF
  COAL AND OIL SHALE EXTRACTION AND CONVERSION WHICH MAY REACH SURFACE W
  ATERS, AND TO DETERMINE BY BOTH FIELD STUDIES AND LABORATORY BIOASSAYS THE
  DEGREE TO WHICH THOSE CHEMICALS MAY BE ACUTELY OR CHRONICALLY TOXIC
   TO FISHES AND AQUATIC INVERTEBRATES, OR MAY BECOME INVOLVED AS PART OF
  THE FOOD CHAIN. FOUR CATEGORIES OF ENERGY DEVELOPMENT ARE BEING CONSIDE
  RED: COAL MINING, COAL COMBUSTION, COAL GASIFICATION AND LIQUEFACTION, AND
   OIL SHALE EXTRACTION AND PROCESSING. POTENTIAL TOXICANTS TO THE AQUATIC E
  NVIRONMENT ARE BEING IDENTIFIED BY A COMBINATION OF FIELD, LABORATORY, AND
   LITERATURE STUDIES, AS WELL AS BY INFORMATION GAINED FROM COOPERATIVE
  INPUT FROM OTHER ENERGY-RELATED RESEARCH PROGRAMS. CONCURRENT CHEMICAL AND
  BIOLOGICAL LABORATORY AND FIELD BIOASSAYS AS WELL AS AQUATIC DISTRIB
  UTION STUDIES DICTATE WHAT ADDITIONAL OR ALTERNATE EMPHASIS IS REQUIRED IN
  THE LABORATORY AND FIELD CHEMICAL STUDIES.
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ORGANIC LEACHING AND PARTICULATE DISPERSION FROM COAL

   START/ COMPL DATE :    07/75 - 06/78 : FUNDING : EST, - FY   77  / $  180000
    TASK/EPA CODE :N625A-081    / R803952-03  (GRANT)  PRIOR  FY76 / $  1458391
   PROJECT OFFICER : D W  KUEHL
   INVESTIGATORS :    M   SYDOR                          UNIV, OF MINNESOTA
                      R   CAPLE                          UNIV, OF MINNESOTA
                      R M CARLSON                        UNIV, OF MINNESOTA
   MILE: 05/77 -CHLORINATION OF DISSOLVED POLYNUCLEAR AROMATICS
         06/77 -QUANTITATION OF POLYNUCLEAR AROMATIC HYDROCARBONS IN H2O BY HPL
         07/77 -A SELECTIVE SYNTHESIS OF POLYMETHYLATED NAPHTHALENES
         07/77 -END ON 2ND YEAR PROGRESS REPORT
         07/77 -TRANSPORT IN THE DULUTH HARBOR
         06/77 -HEPATIC MIXED-FUNCTION OXIDASE ACTIVITY IN RAINBOW TROUT EXPOSE
     A MAJOR THRUST OF THIS PROJECT WILL REMAIN THE MONITORING OF POLYNUCLEAR
     AROMATIC HYDROCARBONS (PAH'S) AT THE MICROPOLLUTANT LEVEL (PPM OR
     LESS). THE HIGH PRESSURE LIQUID CHROMATOGRAPHY-GAS CHROMATOGRAPHY (H
     PLC-GC) IDENTIFICATION METHODOLOGY DEVELOPED IN THESE LABORATORIES FOR THE
      ANALYSIS OF TRACE PAH'S IN COAL LEACHATES, AND IN GENERAL WATER
     SAMPLES, WILL BE EXTENDED AND APPLIED TO SUCH PROBLEMS AS THE BIOCONCE
     NTRATION OF PAH'S IN FISH TISSUE, AIDING IN THE ANALYSIS OF "SECOND-ORDER"
     PAH'S (I.E., METABOLITIES, PHOTOCHEMICAL OXIDATION PRODUCTS, AQUEOUS DISI
     NFECTION PRODUCTS), AND IN THE PAH ANALYSIS OF COAL STEAM DISTILLATES. THE
      ULTIMATE GOAL OF THE PROPOSED INVESTIGATION IS TO DETERMINE THE LONG
     RANGE INFLUENCE OF A COAL LOADING FACILITY ON A GREAT LAKE HARBOR IN
     TERMS OF TRANSPORT OF COAL PARTICULATE MATTER, USING PHYSICAL AND CHEMICAL
     MEASUREMENTS AND APPLICATION OF NUMERICAL MODELING FOR WATER QUALITY TO
     THE DULUTH-SUPERIOR HARBOR.
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CONTROLLED LANDFILL STABILIZATION BY LEACHATE RECYCLE

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START/ COMPL DATE :    07/75 - 06/77 : FUNDING : EST. - FY   77  / $   27024
 TASK/EPA CODE :C618A-7032   / R803953-02  (GRANT)  PRIOR  FY76 / $   250001
PROJECT OFFICER : D R  BRUNNER
INVESTIGATORS :    F   POHLAND                     GEORGIA INST. OF TECHNOLOGY
                   R   WISCOVITCH                  GEORGIA INST. OF TECHNOLOGY
MILE: 02/78 -FINAL REPORT
  OBJECTIVES: THE OBJECTIVES OF THE PROPOSED WORK ARE TO CONFIRM LABORATORY
  STUDIES OF THE LEACHATE RECYCLE CONCEPT WITH LARGER, PROTOTYPE TEST CE
  LLS AND TO ELUCIDATE INFORMATION ON MASS FLUX OF GAS AND LEACHATE COMPONEN
  TS, WITH PARTICULAR ATTENTION TO THE EFFECT OF EVAPOTRANSPIRATION ON THE R
  ATES AND QUANTITIES OF LEACHATE. APPROACH: TWO DOUBLY-LINED TEST CELLS, 12
   X 12 X 10 FEET HIGH, ONE COMPLETELY CLOSED FOR QUANTITATIVE GAS MEA
  SUREMENT AND THE OTHER COVERED WITH SOIL AS IS THE USUAL PRACTICE AT LANDF
  ILLS, WILL RECEIVE IDENTICAL VOLUMES OF WATER AND WEIGHT OF SHREDDED SOLID
   WASTE. THE MOISTURE CONTENT WILL BE BROUGHT TO 60 PERCENT (WET WEIGHT)
  BY ADDING DIGESTED SEWAGE SLUDGE DURING CONSTRUCTION. GAS WILL BE MONI
  TORED FOR CO2, CH4, AND OTHER CONSTITUENTS AND TOTAL VOLUME; LEACHATE WILL
   BE MONITORED FOR BOD, COD, TOC, TOTAL AND INDIVIDUAL VOLATILE ACIDS,
  ALKALINITY, ACIDITY, PH, NITROGEN AND PHORUS, CHLORIDES, SULFIDES OR SUL
  FATES, AND PERTINENT HEAVY AND ALKALINE EARTH METALS. THE SOLID WASTE OF E
  ACH CELL WILL BE SAMPLED AT THE START AND COMPLETION OF THE TESTS FOR VISU
  AL AND QUANTITATIVE CHARACTERIZATION. OUTPUT: MASS FLUX WILL BE DETERMINED
  FOR THE CONTAMINANT MONITORED AND ANALYSES MADE TO INTERPRET AND
  CONTROL THE STABILIZATION PROCESS. MODIFICATIONS TO THE BASIC
  SYSTEMS OPERATION WILL BE MADE AS REQUIRED. THE ENERGY GENERATION POTEN
  TIAL, METHANE PRODUCTION, WILL BE ASSESSED. RECOMMENDED DESIGN AND CONTROL
   PROCEDURES FOR LEACHATE CONTAINMENT AND RECYCLE WILL BE DEVELOPED. A
   RIGOROUS ASSESSMENT OF THE COST/BENEFITS OF THE RECYCLE CONCEPT, IN C
  ONTEXT OF DAILY OPERATION/IMPLEMENTATION, INCLUDING ECONOMIC AND TECHNICAL
  FEASIBILITY, AND THE EXTENT OF POTENTIAL APPLICATION WILL BE PREPARED.
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TOXICITY, INTERACTIONS, AND METABOLISM OF IMPORTANT PESTICIDES IN MAMMALS

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   START/ COMPL DATE :    07/75 - 06/78 : FUNDING : EST. - FY   77  / $   68800
    TASK/EPA CODE :H615F-7628   / R803965      (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : R W  CHADWICK
   INVESTIGATORS :   R M HOLLINGSWORTH            PURDUE UNIVERSITY
                     G K YIM                      PURDUE UNIVERSITY
                     P   LUE                      PURDUE UNIVERSITY
                     G   GHALI                    PURDUE UNIVERSITY
   MILE: 08/77 -IDENTIFY SITE OF CDM-INDUCED RESPIRATORY ARREST
         10/77 -COMPARE CDM SIMILARITY TO COCAINE
         04/78 -CHARACTERIZE ANALGETIC ACTION OF CDM
         08/77 -STUDY CDM EFFECT ON GLUCOSE METABOLISM
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THERE ARE TWO BASIC OBJECTIVES: (1) TO STUDY THE TOXICOLOGY OF FORMAMIDINE PESTICIDES AND (2) TO INVESTIGATE THE ROLE OF GLUTATHIONE TRANSFERASES IN PESTICIDE METABOLISM. RELEVANT TO THE FIRST OBJECTIVE, NEUROLOGICAL, CARDIOVASCULAR, AND RESPIRATORY FUNCTIONS ARE MONITORED DURING POISONING IN CATS TO ESTABLISH SYMPTOMS AND CAUSE OF DEATH. THE SITE OF ACTION AND THE EFFECT OF METABOLISM ON TOXICITY WILL BE STUDIES. INTERACTIONS WITH DRUGS AND DIETARY AMINES WILL BE INVESTIGATED AND THERAPEUTIC PROCEDURES WILL BE DEVELOPED. RELEVANT TO THE SECOND OBJECTIVE, A SURVEY OF COMMON PESTICIDES AS POTENTIAL SUBSTRATES FOR GLUTATHIONE TRANSFERASES IS PLANNED. FURTHER ASSESSMENT OF THE TOXICOLOGICAL SIGNIFICANCE OF THIS SYSTEM, IN VIVO, WILL BE MADE. SEVERE CARDIAC DEPRESSION ACCOMPANIED BY RESPIRATORY FAILURE HAS BEEN SHOWN TO BE THE CAUSE OF DEATH AND RESPIRATORY ASSISTANCE ALONE WAS NOT THERAPEUTICALLY EFFECTIVE IN RABBITS. THE DEPRESSION EFFECT OF CDM WAS SHOWN TO BE AKIN TO THAT OF LOCAL ANESTHETICS WHILE SECONDA PRESSOR AND CONVULSIVE ACTIONS WERE OF CNS ORIGIN. IT HAS BEEN SHOWN THAT INTERACTION OF ORGANOTIN PESTICIDES WITH OTHER TOXICANTS THROUGH THE INHIBITION OF GLUTETHIONE TRANSFERASES IS UNLIKELY SINCE SIGNIFICANT INHIBITION OCCURRED ONLY AT TOXIC LEVELS. FOUR PUBLICATIONS ARE IN PRESS, ANOTHER IS IN PREPARATION AND TWO HAVE BEEN PUBLISHED. BIBLIOGRAPHIC REFERENCES: CHINN, C., A. E. LUND, AND G. K. W. YIM, 1977, CENTRAL ACTIONS OF LIDOCAINE AND A PESTICIDE, CHLORDIMEFORM. NEUROPHARMACOL. IN PRESS. HOLLINGWORTH, R. M., LEISTER, J. AND GHALI, G. Z., 1977, INHIBITION OF MONOAMINE OXIDASE BY FORMAMIDINE PESTICIDES AND ITS RELATIONSHIP TO MAMMALIAN TOXICITY. TOXICOL. APPL. PHARMACOL. IN PRESS.

THE IMPACT OF COAL-FIRED POWER PLANTS ON THE ENVIRONMENT

START/ COMPL DATE :   07/75 - 07/78 : FUNDING : EST. - FY   77 / $ 339991
TASK/EPA CODE :N625A-082   / R803971-04 (GRANT) PRIOR FY76 / $ 7084051
PROJECT OFFICER : G   GLASS
INVESTIGATORS :   O L LOUCKS   UNIV. OF WISCONSIN
MILE: 00/74 -COMPLETE BASE LINE DATA GATHERING-AIR, WATER, PLANTS AND ANIMAL
03/76 -COMPLETE CONSTRUCTION IMPACTS OF POWER PLANT AND COOLING LAKE
12/77 -COMPLETE DATA GATHERING ON SHORT-TERM IMPACTS OF OPERATION
07/78 -COMPLETE DRAFT SITING CRITERIA DOCUMENT
07/78 -COMPLETE MAJOR REPORTS ON ALL IMPACTS ON UNIT 1
07/79 -COMPLETE DATA GATHERING ON SHORT-TERM IMPACTS OF UNIT 2
07/80 -COMPLETE MAJOR REPORTS ON ALL IMPACTS OF UNITS 1 AND 2

THIS PROPOSAL REQUESTS SUPPORT TO CONTINUE INVESTIGATION OF ENVIRONMENTAL CHANGES DUE TO CONSTRUCTION AND OPERATION OF A COAL-FIRED POWER GENERATING STATION, TWO UNITS 527 MEGAWATTS EACH. ORIGINALLY RESEARCH WAS COMMENCED IN 1971 UNDER A GRANT FROM THREE WISCONSIN POWER COMPANIES. THE THIRD YEAR OF THE CURRENT PHASE OF THE PROJECT WILL BE COMPLETED IN JULY 1978. THE SITE IS ON THE FLOODPLAIN OF THE WISCONSIN RIVER NEAR PORTAGE, WISCONSIN. PRIMARY ATTENTION IS GIVEN TO THE IMPACT ON THE AQUATIC ENVIRONMENT. THE APPROACH IS INTER-DISCIPLINARY, WITH DISCRETE SECTIONS FOCUSED ON: AQUATIC INVERTEBRATES, FISH, HYDROGEOLOGY, WATER USE ANALYSIS, WETLANDS ECOLOGY, REMOTE SENSING, AQUATIC CHEMISTRY, HAZARDOUS CHEMICALS IN FISH, ASSESSMENT OF A COOLING SYSTEM, METEOROLOGY, AIR POLLUTION MODELLING, PLANT DAMAGE, TRACE ELEMENTS, ORGANIC CONTAMINANTS, PLUME CHEMISTRY, VISUAL CHANGES, MASS FLOW AND BALANCE OF WATER, AIR, AND CHEMICALS. DATA AVAILABLE THROUGH THE COLUMBIA DATA BANK, IES, MADISON. A PORTION OF THE STUDY IS DEVELOPING, IN CONCERT WITH THE WISCONSIN PUBLIC SERVICE COMMISSION, THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES, AND THREE WISCONSIN PUBLIC UTILITIES, CRITERIA FOR THE SITING OF GENERATING FACILITIES.

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REVIEW AND ANALYSIS OF OIL/WATER SEPARATION LITERATURE

    START/ COMPL DATE :    06/75 - 03/78 : FUNDING : EST. - FY   77  / $   10000
     TASK/EPA CODE :8623C-271     / R803978-01  (GRANT)  PRIOR  FY76 / $   100001
    PROJECT OFFICER : L T  MCCARTHY
    INVESTIGATORS :   R C AHLERT                    RUTGERS THE STATE UNIVERSITY
    MILE: 05/75 -FUNDING PACKAGE SUBMITTED
          06/75 -AWARD FUNDS FOR PROJECT
          07/76 -GRANT AMENDMENT
          12/76 -GRANT AMENDMENT
          04/77 -GRANT AMENDMENT
          03/78 -FINAL REPORT RECEIVED
     THE PROJECT WILL IDENTIFY, ORGANIZE AND INTERPRET TECHNICAL AND COMMERCIAL
      LITERATURE RESOURCES ON OIL/WATER SEPARATION. DETAILED INFORMATION ON
     DESIGN CONSIDERATION AND OPERATING CHARACTERISTICS OF SYSTEMS, DEVICES AND
     PROCESSES, WILL BE ASSEMBLED.
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UTILIZATION OF LIME IRON OXIDES AND FLUX CONTPOL IN THE DESIGN OF
DISPOSAL SITE LINERS TO MINIMIZE POLLUTION MIGRATION
   START/ COMPL DATE :    08/75 - 10/77 : FUNDING : EST. - FY   77  / $   17168
    TASK/EPA CODE :C618A-7033   / R803988-01  (GRANT)  PRIOR  FY76 / $  1417791
   PROJECT OFFICER : M H  ROULIER
   INVESTIGATORS :   W H FULLER
                     A W WARRICK                          UNIV. OF ARIZONA
                     D M HENDRICKS                        UNIV. OF ARIZONA
   MILE: 08/75 -PROJECT START                             UNIV. OF ARIZONA
        10/77 -PROJECT COMPLETION
     OBJECTIVES: STUDY THE EFFECTIVENESS OF CONTROLLING FLOW RATE AND OF USING
     LIME AND HYDROUS OXIDES OF IRON AS POROUS DISPOSAL SITE LINING MATERIALS
     FOR RETARDING THE MIGRATION OF THE TRACE ELEMENTS AS, BE, CD, HG, NI, PB,
     SE, V, AND ZN THROUGH SOIL. APPROACH: PASS LANDFILL LEACHATE SPIKED WITH T
     RACE ELEMENTS THROUGH COLUMNS OF DISTURBED SOILS UNDER ANEROBIC CONDITIONS
      AT CONTROLLED FLOW RATES. WORK WILL BE SEGMENTED AS FOLLOWS: A. EVA
     LUATE THE INFLUENCE OF LIME AND IRON HYDROUS OXIDE LINERS ON THE MIGRATION
     RATE OF SELECTED TRACE ELEMENTS. B. DETERMINE THE INFLUENCE OF SOLUTION
     FLUX OR FLOW RATE ON ATTENUATION OF SELECTED TRACE ELEMENTS BY SOIL AND
     BY LINEAR MATERIALS. C. MODIFY AN EXISTING MATHEMATICAL MODEL TO PREDICT
     CHANGES IN QUALITY OF LEACHATE AS IT PERCOLATES THROUGH LINER MATERIA
     LS. D. RECOMMEND PROCEDURES FOR FIELD VERIFICATION OF THE EFFECTIVENESS OF
      THE LINER TECHNIQUES DEVELOPED IN THIS PROJECT. PROGRESS: LININGS OF
     CRUSHED LIMESTONE RETARD MOVEMENT OF METALLIC, CATION-FORMING TRACE
     ELEMENTS MORE EFFECTIVELY THAN ANION-FORMING TRACE ELEMENTS. RETARDA
     TION BY A COMBINATION OF LIMESTONE AND SOIL IS GREATER THAN THE SUM OF THE
     EFFECT OF EACH ALONE. THOUGH EFFECTIVE IN RETARDATION, HYDROUS IRON
     OXIDES CREATE ADDITIONAL PROBLEMS DUE TO THE RELEASE OF REDUCED IRON. FLUX
     DEPENDENT POLLUTANT RETARDATION DOES NOT APPEAR TO BE SIGNIFICANT
     ENOUGH TO WARRANT SUBSTANTIAL WORK OF FLOW RATE CONTROL.
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II-131

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EVALUATION OF WASTE CITRUS ACTIVATED SLUDGE IN POULTRY FEEDS

    START/ COMPL DATE :    07/76 - 04/79 : FUNDING : EST. - FY   77  / $    3000
     TASK/EPA CODE :B610B-475    / R803997-01  (GRANT)  PRIOR  FY76 / $   240001
    PROJECT OFFICER : H W  THOMPSON
    INVESTIGATORS :    B L DAMRON                          STATE UNIVERSITY OF FLA. SYS.
                       R H HARMS                           STATE UNIVERSITY OF FLA. SYS.
                       D M JANKY                           STATE UNIVERSITY OF FLA. SYS.
    MILE: 07/76 -FUNDING PACKAGE SUBMITTED
          07/76 -AWARD FUNDS FOR PROJECT
          06/77 -FUNDING INCREMENT
          04/79 -FINAL REPORT RECEIVED
     OBJECTIVES: A) TO ESTABLISH ANALYTICAL VALUES FOR CITRUS SLUDGE DEHYDRATED
      BY THE CARVER-GREENFIELD PROCESS THROUGH PROXIMATE ANALYSIS, TRACE M
     INERAL ANALYSES, DETERMINATION OF SULFUR AMINO ACID AND LYSINE CONTENT AND
     METABOLIZABLE ENERGY STUDIES. B) TO DETERMINE THE DEGREE OF INTERACTION B
     ETWEEN CITRUS SLUDGE AND VITAMIN D3 IN BROILER DIETS. C) THE EVALUATION OF
     THE BIOLOGICAL AVAILABILITY OF PHOSPHORUS CONTAINED IN CITRUS SLUDGE. D)
     TO EVALUATE THE PROTEIN QUALITY OF CITRUS SLUDGE. E) THROUGH THE USE O
     F LOW-PIGMENT DIETS, TO ATTEMPT TO DETERMINE THE PIGMENTING VALUE OF CITRU
     S SLUDGE IN EGG YOLKS AND THE BREAST SKIN AND SHANKS OF BROILERS. A SERIES
      OF BROILER FEEDING TRIALS WILL BE USED TO DETERMINE THE METABOLIZABLE
     ENERGY CONTENT, PROTEIN QUALITY AND PHOSPHORUS AVAILABILITY OF CITRUS
     SLUDGE. THE DEGREE OF VITAMIN D DESTRUCTION BY CITRUS SLUDGE WILL ALSO BE
     STUDIED. THE PIGMENTING VALUE OF THE PRODUCT WILL BE DETERMINED USING
     WHITE CORN DIETS FOR 4-8 WEEK OLD BROILERS AND LAYING HENS.
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ENVIRONMENTAL EFFECT OF UTILIZING SOLID WASTE AS A SUPPLEMENTARY
POWER-PLANT FUEL
   START/ COMPL DATE :    06/74 - 10/78 : FUNDING : EST. - FY   77  / $   98000
    TASK/EPA CODE :B624B-392     / R804008-02  (GRANT)  PRIOR  FY76 / $  5030001
   PROJECT OFFICER : R    OLEXSEY
   INVESTIGATORS :    D A VAUGHAN                    BATTELLE MEMORIAL INSTITUTE
                      W K BOYD                       BATTELLE MEMORIAL INSTITUTE
                      H H KRAUSE                     BATTELLE MEMORIAL INSTITUTE
                      R B ENGDAHL                    BATTELLE MEMORIAL INSTITUTE
   MILE: 08/77 -FUNDING SUPPLEMENT
         10/78 -FINAL REPORT
    THE OBJECTIVE OF THIS PROJECT IS TO INVESTIGATE THE BENEFITS TO THE EN
    VIRONMENT RESULTING FROM THE UTILIZATION OF SOLID WASTE AS A SUPPLEMENTARY
    FUEL IN EXISTING COAL-FIRED POWER PLANTS. THE APPROACH IS TO
    EVALUATE THE GASEOUS AND PARTICULATE EMISSION PLUS THE CORROSIVENESS OF C
    OMBUSTION PRODUCTS AS A FUNCTION OF REFUSE-COAL RATIO AND AS A FUNCTION OF
    SULFUR CONTENT OF THE COAL. EXPERIMENTS WILL BE CONDUCTED IN AN
    OPERATING POWER STATION THROUGH COOPERATION OF THE CITY OF COLUMBUS, OHIO,
    AND AT THE HARRISBURG (PA.) WATERWALL CO. INCINERATION PLANT. FURNACE AND
    STACK GAS AND PARTICULATE SAMPLES WILL BE COLLECTED THROUGHOUT THE PERIODS
    THAT CORROSION PROBES ARE INSERTED AT SEVERAL LOCATIONS IN THE HE
    AT-RECOVERY PASSES. THESE PROBES WILL BE EXAMINED FOR CORROSION ATTACK AND
    DEPOSIT COMPOSITION FOR VARIOUS GAS AND METAL TEMPERATURES TO PROVIDE
    GUIDANCE IN FUTURE UTILIZATION OF SOLID WASTE AS A SUPPLEMENTARY FUEL.
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MEASUREMENT OF TROPOSPHERIC AND STRATOSPHERIC TRACE GASES BY GAS
CHROMATOGRAPHY
   START/ COMPL DATE :    04/77 - 04/78 : FUNDING : EST. - FY   77  / $   50000
    TASK/EPA CODE :G603A-AI-01  / R804033-03  (GRANT)  PRIOR  FY76 / $   360001
   PROJECT OFFICER : P    HANST
   INVESTIGATORS :   D R CRONN                     WASHINGTON STATE UNIVERSITY
                     R A RASMUSSEN                 WASHINGTON STATE UNIVERSITY
                     E   ROBINSON                  WASHINGTON STATE UNIVERSITY
   MILE: 02/78 -FINAL REPORT
     THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO O
     THERS. THE OBJECTIVE IS TO MAKE MEASUREMENTS OF THE VERTICAL CONCENTRATION
      DISTRIBUTIONS OF SELECTED TRACE GAS SPECIES IN THE TROPOSPHERE AND LOWER
      STRATOSPHERE. EMPHASIS WILL BE PLACED ON DETERMINATIONS OF HALOCARBONS
     AND NON-METHANE HYDROCARBONS. DETERMINATION OF THE CONCENTRATIONS OF THE
     HALOCARBON SPECIES WILL BE ACCOMPLISHED BY THE METHODS OF ELECTRON C
     APTURE - GAS CHROMATOGRAPHY AND GAS CHROMATOGRAPHY - MASS SPECTROMETRY WHI
     LE GAS CHROMATOGRAPHY WITH FLAME IONIZATION DETECTION WILL BE EMPLOYED FOR
     THE DETERMINATION OF THE HYDROCARBONS. SAMPLES WILL BE COLLECTED BY
     AIRCRAFT FLIGHTS IN THE UNITED STATES.
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MEASUREMENT OF TROPOSPHERIC AND STRATOSPHERIC TRACE GASES BY GAS
CHROMATOGRAPHY
   START/ COMPL DATE :    04/77 - 04/78 : FUNDING : EST. - FY   77  / $   28000
    TASK/EPA CODE :G603A-AI-04  / R804033-03  (GRANT)  PRIOR  FY76 / $   360001
   PROJECT OFFICER : P    HANST
   INVESTIGATORS :   D R CRONN                           WASHINGTON STATE UNIVERSITY
                     R A RASMUSSEN                       WASHINGTON STATE UNIVERSITY
                     E   ROBINSON                        WASHINGTON STATE UNIVERSITY
   MILE: 01/78 -REPORT ON HALOGENATED COMPOUNDS IN ATMOSPHERE
    THE OBJECTIVE IS TO MAKE MEASUREMENTS OF THE VERTICAL CONCENTRATION DISTR
    IBUTIONS OF SELECTED TRACE GAS SPECIES IN THE TROPOSPHERE AND LOWER STRATO
    SPHERE. EMPHASIS WILL BE PLACED ON DETERMINATIONS OF HALOCARBONS AND NON-M
    ETHANE HYDROCARBONS. DETERMINATION OF THE CONCENTRATIONS OF THE HALOCARBON
     SPECIES WILL BE ACCOMPLISHED BY THE METHODS OF ELECTRON CAPTURE - GAS
     CHROMATOGRAPHY AND GAS CHROMATOGRAPHY-MASS SPECTROMETRY -WHILE GAS
     CHROMATOGRAPHY WITH FLAME IONIZATION DETECTION WILL BE EMPLOYED FOR THE
    DETERMINATION OF THE HYDROCARBONS. SAMPLES WILL BE COLLECTED BY AIRCRAFT
    FLIGHTS IN THE UNITED STATES.
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CATALYTIC DESULFURIZATION AND DENITROGENATION

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START/ COMPL DATE :    08/75 - 07/78 : FUNDING : EST, - FY   77  / $   70360
 TASK/EPA CODE :F623A-14     / R804123-03  (GRANT)  PRIOR  FY76 / $   918781
PROJECT OFFICER : T W  PETRIE
INVESTIGATORS :   C N SATTERFIELD               MASS, INST, OF TECHNOLOGY
                  M   MODELL                    MASS, INST, OF TECHNOLOGY
                  J F COCCHETTO                 MASS, INST, OF TECHNOLOGY
MILE: 10/75 -REPORT ON HDS OF THIOPHENE AND HDN OF PYRDINE
      09/76 -REPORT ON EXTENSION TO HIGH PRESSURE OF HDS AND HDN
      09/77 -REPORT ON EXTENSION TO MORE COMPLEX SUBSTANCES
      09/78 -SUMMARY REPORT INCLUDING MODEL OF HDS-HDN INTERACTION
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CATALYTIC HYDRODESULFURIZATION (HDS) AND HYDRODENITROGENATION (HDN) REACIONS FOR THE REMOVAL OF ORGANIC SULFUR AND NITROGEN COMPOUNDS FROM LIQUID FUELS ARE BECOMING INCREASINGLY IMPORTANT AS STRICT SULFUR AND NITROGEN OXIDE EMISSION STANDARDS ARE SET, AND "DIRTIER" OILS DERIVED FROM SHALE AND COAL ATTAIN WIDER USE, A QUANTITATIVE DESCRIPTION OF THE INTERFERENCES BETWEEN THESE TWO REACTIONS, WHICH HAVE ONLY RECENTLY BEGUN TO BE STUDIED, IS NECESSARY FOR OPTIMAL DESIGN OF COMMERCIAL PROCESSING UNITS, TO DATE, WE HAVE STUDIED THIOPHENE, PYRIDINE AND QUINOLINE AS REPRESENTATIVE SULFUR AND NITROGEN COMPOUNDS IN A CONTINUOUS FLOW MICROREACTOR TO MODEL BASIC INTERACTIONS, PYRIDINE INHIBITS THIOPENE HDS UNDER ALL EXPERIMENTAL CONDITIONS USED, SULFUR COMPOUNDS EXHIBIT A DUAL EFFORT ON THE HDN OF PYRIDINE; A REACTION RATE INHIBITION GIVES WAY TO AN EHANCEMENT AT MORE SEVERE REACTION CONDITIONS, THEORETICAL CONSIDERATIONS HAVE BEEN PRESENTED TO ACCOUNT FOR EACH OF THESE EFFECTS, REACTIONS OF MORE COMPLEX COMPOUNDS AND THEIR INTERACTIVE REACTION KINETICS ARE CURRENTLY UNDER INVESTIGATION,

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ASSESSMENT OF THE APPLICATION OF MULTIVARIATE ANALYSIS IN ECOLOGICAL
INVESTIGATIONS OF WATER POLLUTION
   START/ COMPL DATE :    11/75 - 11/79 : FUNDING : EST. - FY   77  / $  105000
    TASK/EPA CODE :M608C-030     / R804127-01  (GRANT)  PRIOR  FY76 / $   800311
   PROJECT OFFICER : R C  SWARTZ
   INVESTIGATORS :    D F BOESCH
   MILE: 11/77 -ANNUAL REPORT                          VIRGINIA INST. OF MARINE SCI.
         11/79 -FINAL REPORT
     THE OBJECTIVE IS THE FURTHER EVALUATION OF THE NUMERICAL TECHNIQUES OF
     CLARIFICATION (CLUSTER ANALYSIS) FOR USE IN ECOLOGICAL INVESTIGATIONS
     OF WATER POLLUTION, EXPANDING THE EXPECTED PRODUCTS OF ONGOING RESEARCH.
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804150

This Research Grant involves the study of the technical and economic aspects of preparing and using densified forms of municipal solid waste as a supplementary fuel in industrial and institutional stoker coal fired boilers. Investigations will be conducted to establish methodology for preparing densified refuse derived fuel (d-RDF). Process and product characterizations will be developed to enable establishment of specifications for d-RDF. Densification forms will include pellets, briquettes, and cubettes. Independent boiler burn tests and operations will be conducted in conjunction with this research to fully characterize the concept.

MINERALOGY OF OVERBURDEN AS RELATED TO GROUNDWATER DEGRADATION IN THE STRIP MINING OF COAL

START/ COMPL DATE : 12/75 - 00/00 : FUNDING : EST. - FY 77 / $ 275000
TASK/EPA CODE :L625B-03 / R804162-01 (GRANT) PRIOR FY76 / $ 3000001
PROJECT OFFICER : B NEWPORT
INVESTIGATORS : D L KLOEPPER COLORADO SCHOOL OF MINES
J S FRYBERGER COLORADO SCHOOL OF MINES

MILE: 01/78 -OVERBURDEN MINERALOGY - GROUND WATER QUALITY CORRELATION

OBJECTIVE: THE OBJECTIVE IS TO DEVELOP A METHOD OF PREDICTING POTENTIAL GROUND WATER DEGRADATION IN STRIP COAL MINING ON THE BASIS OF THE MINERALOGY OF THE OVERBURDEN. APPROACH: THE APPROACH IS TO DETERMINE THE MINERALOGY OF CORES IN UNDISTURBED OVERBURDEN ADJACENT TO SPOIL PILES WHICH HAVE UNDERGONE EXTENSIVE CHEMICAL AND BIOLOGICAL WEATHERING. EXTENSIVE GROUND WATER QUALITY DATA WILL BE GATHERED FROM WELLS DRILLED THROUGH AND DOWN-DIP FROM SPOIL PILES. USING THIS DATA BASE, A METHOD OF PREDICTING GROUND WATER QUALITY IN POST COAL STRIP MINING OPERATIONS WILL BE DEVELOPED. CURRENT PROGRESS: THIS PROJECT WAS FUNDED ON DECEMBER 22, 1975. DUE TO ADVERSE CLIMATICAL CONDITIONS IN N.W. COLORADO, INITIAL DRILLING, CORING AND COMPLETION OPERATIONS WERE DELAYED UNTIL MARCH 22, 1976. CORING OPERATIONS HAVE BEEN PARTICULARLY SUCCESSFUL EXCEPT IN SPOIL PILES WHERE HIGH PERCENTAGE CORE RECOVERY IN THIS UNCONSOLIDATED MATERIAL HAS BEEN DIFFICULT TO ATTAIN. PORTABLE WELL PUMPING AND SAMPLING EQUIPMENT UTILIZING EXPANDABLE PACKERS FOR ZONE ISOLATION HAS BEEN SUCCESSFULLY DEMONSTRATED. LYSIMETERS AND ASSOCIATED FLUID RECOVERY SYSTEMS HAVE BEEN INSTALLED IN SELECTED WELLS. WELL SAMPLING WAS BEGUN IN JUNE 1976. ANALYTICAL DATA GENERATED FROM THE INITIAL SAMPLES WILL CONSIST OF OVER 45 PARAMETERS FROM APPROXIMATELY 25 SAMPLES. MINERALOGY OF CORE SAMPLES ARE BEING DETERMINED UTILIZING X-RAY DIFFRACTION AND X-RAY FLUORESCENCE. THE FIRST INTERIM REPORT ON THIS PROJECT IS ON SCHEDULE AND WILL BE FORTHCOMING IN OCTOBER 1976. A GRANT AMENDMENT, R-804162-01-01, IS DIRECTED TOWARD EXPANDING THE "SCOPE OF WORK" OUTLINED IN EXISTING GRANT 804162-01. THIS AMENDMENT WILL PERMIT SEVERAL ADDITIONAL MINING SITES TO BE STUDIED, THUS BROADENING THE DATA BASE TO INCLUDE VARYING MINERALOGICAL AND CLIMATOLOGICAL CONDITIONS AND STRENGTHENING THE ACCURACY AND APPLICABILITY OF THE PREDICTIVE NATURE OF FINDINGS FORMULATED IN THE ORIGINAL GRANT.

A LONGITUDINAL EVALUATION OF LEAD BODY BURDEN IN GROWING CHILDREN

START/ COMPL DATE : 05/76 - 01/79 : FUNDING : EST. - FY 77 / $ 216205
TASK/EPA CODE :D614B-052 / R804168 (GRANT) PRIOR FY76 / $ 1235001
PROJECT OFFICER : G F CRAUN
INVESTIGATORS : A H LUBIN CHILDRENS HOSP.

ASSESSMENT AND CORRELATIONAL ANALYSES OF BIOCHEMICAL, NUTRITIONAL, AND GROWTH PARAMETERS WITH THE AMOUNT OF EXPOSURE OF COMMONLY ACCEPTED SOURCES OF ENVIRONMENTAL LEAD (AIR, DUST, AND WATER) ARE BEING PERFORMED SEQUENTIALLY THROUGHOUT THE MOTHER'S PREGNANCY AND THE SUBSEQUENT OFFSPRING'S FIRST TWO YEARS OF LIFE TO DETERMINE THE RELATIVE EFFECT OF MULTIPLE SOURCES OF LEAD EXPOSURE ON THE MOTHER AND CHILD AND THE LONGITUDINAL CHANGES IN BLOOD LEAD CONCENTRATIONS AND BODY BURDEN OF LEAD IN THE GROWING INFANT AND CHILD. APPROXIMATELY 200 TO 250 WOMEN IN EACH OF THREE CITIES, COLUMBUS, OHIO; BOSTON, MASSACHUSETTS; AND NEW BEDFORD, MASSACHUSETTS, ARE BEING ENROLLED EARLY IN THE SECOND TRIMESTER OF THEIR PREGNANCIES. DIFFERENCES IN SOCIOLOGICAL AND ENVIRONMENTAL ASPECTS WHICH MAY CONTRIBUTE TO UNDUE BODY LEAD BURDEN FROM CITY TO CITY SHOULD BE ELUCIDATED. INITIAL DATA ON APPROXIMATELY 150 PREGNANT WOMEN AND ON APPROXIMATELY 10 OF THEIR OFFSPRING INDICATE A VERY DIRECT CORRELATION BETWEEN LEAD IN BLOOD IN THE MOTHER, CORD BLOOD LEAD DETERMINATIONS, AND NEWBORN INFANT LEAD VALUES. THERE ALSO APPEARS TO BE A SIGNIFICANT DIFFERENCE IN THE VALUES DETERMINED IN THE POPULATIONS OF THE DIFFERENT CITIES. OBSERVATIONS ON ENVIRONMENTAL ASPECTS SHOW A REMARKABLY CONSTANT FIGURE FOR LEAD IN AIR IN ALL CITIES, AND LEAD IN DUST RESULTS CONFIRM DUST TO BE A SIGNIFICANT SOURCE OF LEAD INTAKE FOR CHILDREN.

ELECTROLYTIC TREATMENT OF OILY WASTEWATER

START/ COMPL DATE :   04/77 - 09/78 : FUNDING : EST. - FY 77 / $ 43000
TASK/EPA CODE :B610B-142   / S804174-02 (GRANT) PRIOR FY76 / $ 1000001
PROJECT OFFICER : H B DURHAM
INVESTIGATORS :   R L GEALER   FORD MOTOR COMPANY
M M WEINTRAUB   FORD MOTOR COMPANY
A   GOLOVOY   FORD MOTOR COMPANY
MILE: 04/77 -FUNDING PACKAGE SUBMITTED
05/77 -AWARD FUNDS FOR PROJECT
09/78 -FINAL REPORT RECEIVED

OBJECTIVE: DEMONSTRATE THE FEASIBILITY AND INVESTIGATE THE DURABILITY AND ECONOMICS OF THE ELECTROLYTIC PROCESS FOR TREATING OILY WASTEWATER FROM A MANUFACTURING PLANT. APPROACH: DEMULSIFICATION IS ACCOMPLISHED BY PASSING PLANT OILY WASTEWATER EMULSION THROUGH PERMEABLE IRON ELECTRODES. CURRENT PLANS AND PROGRESS: DURING THE FIRST YEAR OF THE PROGRAM, A ONE GALLON PER MINUTE ELECTROLYTIC UNIT WAS CONSTRUCTED AND PLACED IN A MANUFACTURING PLANT AND EIGHT BATCHES (ABOUT 3000 GALLONS EACH) OF THE PLANT OILY WASTEWATER WERE PROCESSED THROUGH THE UNIT. THE OIL CONTENT OF THE PROCESSED WATER GENERALLY WAS BELOW 50 PPM AND IN SEVERAL CASES BELOW 10 PPM. THE SECOND YEAR OF THE PROGRAM WILL INCLUDE OPTIMIZATION OF THIS SYSTEM WITH RESPECT TO CURRENT AND FLOW RATES AS A FUNCTION OF PLANT EFFLUENT COMPOSITION, INVESTIGATION OF THE SLUDGE FLOTATION SCHEME, AND A PRELIMINARY EXAMINATION REGARDING UTILIZATION OF THE OIL-RICH SLUDGE.

EVALUATE AN IMPROVED MANUAL PARTICLE SIZE FRACTIONATOR

START/ COMPL DATE : 09/75 - 08/79 : FUNDING : EST. - FY 77 / $ 30000
TASK/EPA CODE :G712B-BE-36 / R804190-03 (GRANT) PRIOR FY76 / $ 600001
PROJECT OFFICER : C W LEWIS
INVESTIGATORS : A R MCFARLAND TEXAS A & M UNIVERSITY SYSTEM
MILE: 09/78 -FINAL REPORT

OBJECTIVES: TO EVALUATE AND IMPROVE THE PERFORMANCE OF THE DICHOTOMOUS VIRTUAL IMPACTOR AEROSOL SAMPLER. APPROACH: A DICHOTOMOUS SAMPLER IS A DEVICE FOR COLLECTING AMBIENT AEROSOL SAMPLES IN TWO SIZE RANGES, CONSISTING OF PARTICLES WHOSE AERODYNAMIC DIAMETER IS LESS THAN, AND GREATER THAN 3.5 MICRONS. A CRUCIAL FACTOR IN OBTAINING QUANTITATIVE RESULTS WITH SUCH SAMPLERS IS THE KNOWLEDGE OF SAMPLING EFFICIENCY, AS IT DEPENDS ON BOTH PARTICLE SIZE AND WIND SPEED. BOTH MATHEMATICAL MODELLING AND WIND TUNNEL TESTS ARE BEING USED TO OBTAIN THIS INFORMATION. CURRENT PLANS /PROGRESS: A LONG SERIES OF WIND TUNNEL TESTS OF ALTERNATIVE AEROSOL INLET HEADS HAS RESULTED IN A HEAD DESIGN WHICH EXHIBITS THE GENERALLY FAVORABLE CHARACTERISTICS OF HIGH SAMPLING EFFICIENCY UP TO ABOUT 20 MICRONS, AND MINIMAL WIND SPEED DEPENDENCE. A MATHEMATICAL MODELLING STUDY WILL NEXT BE PERFORMED TO BETTER UNDERSTAND THE RESULTS SO FAR OBTAINED LARGELY BY EMPIRICAL MEANS, AND WHICH WILL MAKE POSSIBLE THE DESIGN OF FUTURE INSTRUMENTS EMPLOYING THE DICHOTOMOUS PRINCIPLE AT OTHER FLOW RATES AND CUT-POINTS. IN PARTICULAR AN EXPERIMENTAL INVESTIGATION WILL BE MMDE OF A VIRTUAL IMPACTOR WITH A 0.1 MICRON CUT-POINT.

EFFECTS OF SIZED ASBESTOS FIBERS ON CELL DNA MEMBRANE
STRUCTURE-FUNCTION, METABOLISM & CELL TRANSFORMATION (ABBREV)

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   START/ COMPL DATE :    06/77 - 06/78 : FUNDING : EST, - FY   77  / $  130956
    TASK/EPA CODE :D614B-059    / R804201-02  (GRANT)  PRIOR  FY76 / $   953281
   PROJECT OFFICER : R G  TARDIFF
   INVESTIGATORS :   R   HART                          OHIO STATE UNIVERSITY
                     D K ALLISON                       OHIO STATE UNIVERSITY
                     S   HAUGHT                        OHIO STATE UNIVERSITY
   MILE: 04/77 -ANNUAL REPORT
         04/78 -FINAL REPORT
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THE LONG RANGE GOAL OF THIS PROGRAM IS TO ULTIMATELY UNDERSTAND THE MECHANISMS BY WHICH ASBESTOS FIBERS INDUCE CARCINOGENESIS IN MAMMALIAN CELLS AND TO DEVELOP MEANS TO PREVENT, CONTROL OR REVERSE THE PROCESS. THE IMMEDIATE OBJECTIVES OF THIS PROPOSAL ARE: (A) TO DETERMINE WHETHER ASBESTOS FIBERS INDUCE CELLULAR TRANSFORMATION IN VITRO; (B) TO DETERMINE THE ABILITY OF ASBESTOS EITHER TO PRODUCE DNA DAMAGE (PRESUMABLY A PREREQUISITE FOR MANY CHEMICAL AND PHYSICAL CARCINOGENS) OR TO INHIBIT ITS REPAIR; (C) TO DEFINE ANY SYNERGISTIC INTERACTION BETWEEN ASBESTOS, CHEMICAL CARCINOGENS AND/OR ONCOGENIC VIRUSES; (D) USING INTEGRATED VIRUS GENES, TO EXPLORE THE EFFECTS ON GENE EXPRESSION OF SIZED ASBESTOS FIBERS WITH AND WITHOUT CHEMICAL CARCINOGENS AND CO-CARCINOGENS; (E) TO QUANTITATE THE EFFECTS OF ASBESTOS ON MEMBRANE COMPOSITION AND STRUCTURE; (F) TO DETERMINE WHETHER CHANGES IN CELL MEMBRANE FUNCTION AND STRUCTURE ARE SOLELY A CONSEQUENCE OF CARCINOGENESIS OR CONTRIBUTE DIRECTLY TO THE PROCESS AT SOME STAGE; (G) SIMULTANEOUSLY TO QUANTITATE THE EFFECTS OF ASBESTOS ON A NUMBER OF INTERMEDIARY METABOLITES, IN ORDER TO ELUCIDATE THE EFFECTS ON ENZYME REGULATION WITH AND WITHOUT THE CONTRIBUTORY EFFECTS OF SELECTED CARCINOGENS AND CO-CARCINOGENS AND (H) TO ATTEMPT DEVELOPMENT OF A CORRELATION BETWEEN THE VARIOUS PHYSIOLOGICAL PROCESSES STUDIED AND THE SUSCEPTIBILITY OF OUR VARIOUS TEST SYSTEMS TO TRANSFORMATION BY VARIOUS SIZED ASBESTOS FIBERS IN THE PRESENCE AND ABSENCE OF OTHER CARCINOGENIC AGENTS.

II-142

STUDIES ON THE MUTAGENICITY OF CHEMICAL CARCINOGENS

START/ COMPL DATE :   05/76 - 05/78 : FUNDING : EST. - FY   77 / $ 41879
TASK/EPA CODE :ID6148-057   / R804202-02 (GRANT) PRIOR FY76 / $ 486001
PROJECT OFFICER : G F CRAUN
INVESTIGATORS :   R J SHEEHY   ATLANTA UNIVERSITY CTR. CORP.

THE OVERALL OBJECTIVES OF THIS RESEARCH PROJECT ARE TO (1) STANDARDIZE A MUTAGEN SCREENING SYSTEM (AMES BACK MUTATION TEST) WHICH IS SENSITIVE AND HAS A HIGH DEGREE OF REPRODUCIBILITY, (2) UTILIZE THIS SYSTEM TO IDENTIFY THE MUTAGENIC CHARACTER OF CHEMICAL CONTAMINANTS IN WATER AND (3) DEVELOP A FORWARD MUTAGENESIS SCREENING SYSTEM TO BE USED IN CONJUNCTION WITH THE BACK MUTAGENESIS SYSTEM. SPECIFICALLY, WE ARE CURRENTLY TESTING KNOWN CHEMICALS PRESENT IN NEW ORLEANS DRINKING WATER SUPPLIES, AS WELL AS TESTING BULK DRINKING WATER IN THE METROPOLITAN ATLANTA AREA. ONE FEATURE OF OUR RESULTS DICTATES THE NEED FOR ANOTHER TEST SYSTEM FOR CHEMIALS THAT PROVE TOO TOXIC FOR TESTING IN THE AMES SYSTEM. THEREFORE, SOME CHEMICALS ARE BEING EVALUATED BY THEIR ABILITY TO PRODUCE SINGLE STRANDED BREAKS IN DNA.

804204

II-143

The overall objectives of this research project are to (1) standardize a mutagen screening system (Ames Back Mutation Test) which is sensitive and has a high degree of reproducibility, (2) utilize this system to identify the mutagenic character of chemical contaminants in water and (3) develop a forward mutagenesis screening system to be used in conjunction with the back mutagenesis system. Specifically, we are currently testing known chemicals present in New Orleans drinking water supplies, as well as testing bulk drinking water in the metropolitan Atlanta area. One feature of our results dictates the need for another test sytem for chemicals that prove too toxic for testing in the Ames system. Therefore, some chemicals are being evaluated by their ability to produce single stranded breaks in DNA.

1. To further develop, document and elaborate biological control approaches for urban shade tree pest management.

    a. Survey for natural enemies of urban pest insects, particularly on urban vegetation and shade trees.

    b. Explore for natural enemies of
        1. *Pyrrhalta luteola*, the elm leaf beetle
        2. *Illinoia* (*Macrosiphum*) *liriodendri*, the tulip tree aphid
        3. *Hyphantria cunea*, the fall webworm

    c. Complete evaluations of successfully introduced parasites
        1. *Trioxys curvicaudus* on the linden aphid: *Eucallipterus tiliae*
        2. *Trioxys hortorum* on the elm aphid: *Tinocallis platani*

2. Currently we operate integrated control programs for five cities and one school district. The emphasis in this project is to further develop, document and plan to extend the biological control of urban pest insects.

NATIONAL MARINE POLLUTION MONITORING PROGRAM

II-145

START/ COMPL DATE : 12/75 - 12/78 : FUNDING : EST. - FY 77 / $ 56192
TASK/EPA CODE :P608C-12 / R804215-01 (GRANT) PRIOR FY76 / $ 6948191
PROJECT OFFICER : G HOFFMAN
INVESTIGATORS : E D GOLDBERG UNIV. OF CALIFORNIA
MILE: 12/77 -FINAL REPORT ENTITLED, "NATIONAL MARINE POLLUTION MONITORING

A SURVEILLANCE OF FOUR COLLECTIVES OF POLLUTANTS IN U.S. COASTAL WATERS IS BEING CARRIED OUT THROUGH THEIR CONCENTRATIONS IN TWO SENTINEL ORGANISMS--MUSSELS AND BARNACLES. THE POLLUTANT SPECIES INCLUDE HEAVY METALS (LEAD, CADMIUM, MERCURY, SELENIUM, ZINC, SILVER AND COPPER), CHLORINATED HYDROCARBONS (DDT RESIDUES, POLYCHLORINATED BIPHENYLS, HEXACHLORBENZENE, DIELDRIN, ENDRIN, HEPTACHLOR, BENZENE HEXACHLORIDE, CIS AND TRANS CHLORDANE AND THE INSECTICIDAL DERIVATIVES OXYCHLORDANE AND HEPTACHLOR EPOXIDE); ARTIFICIAL RADIONUCLIDES (PLUTONIUM-238, PLUTONIUM 239 AND 240; AMERICIUM 241 AND CESIUM-137); AND PETROLEUM HYDROCARBONS (TO INCLUDE MEASURES OF THE CONCENTRATIONS OF ALKANES, CYCLOALKANES AND AROMATICS, INCLUDING 2, 3, 4, AND 5 RING POLYNUCLEAR CONDENSED SPECIES). THE PROGRAM INCUDES SITES OFF THE EAST, WEST AND GULF COASTS OF THE U.S. AS WELL AS OFF ALASKA, GUAM AND SAMOA. OVER TWO HUNDRED AND FIFTY SAMPLES WILL BE TAKEN DURING THE FIRST TWO YEARS OF THE PROJECT AND ANALYZED IN 8 LABORATORIES, TWO FOR EACH SET OF POLLUTANTS. INTER LABORATORY COMPARISONS ARE BEING MADE ON THE POLLUTANT ANALYSES. THE GOALS OF THE PROGRAM WILL BE THE ASSESSMENT TO THE U.S. COASTAL WATERS FOR THE SUPPORT OF MARINE RESOURCES SUCH AS FOOD FROM THE SEA, THE VITALITY OF COMMUNITIES OF MARINE ORGANISMS AND THE CONTINUED USE OF NON-LIVING RESOURCES SUCH AS BEACHES AND HARBORS AND THE PREDICTION OF FUTURE EXPOSURE LEVELS OF POLLUTANTS BASED UPON THE BEST EXISTING INFORMATION AND MODELS.

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A STANDARD PROGRAM FOR ENVIRONMENTAL IMPACT ASSESSMENT - PHASE 1
ICHTHYOPLANKTON SAMPLING
   START/ COMPL DATE :    12/75 - 03/78 : FUNDING : EST. - FY   77  / $   10530
    TASK/EPA CODE :P608C-05     / R804216-01  (GRANT)  PRIOR  FY75 / $   649821
   PROJECT OFFICER : A D  BECK
   INVESTIGATORS :    M A HYMAN                      UNIV. OF RHODE ISLAND
                      S B SAILA                      UNIV. OF RHODE ISLAND
   MILE: 03/78 -FINAL REPORT ENTITLED, "A STANDARD PROGRAM FOR ENVIRONMENTAL IM
     IT IS PROPOSED THAT THE ENVIRONMENTAL PROTECTION AGENCY DEVELOP AN ENVIRO
     NMENTAL IMPACT PROGRAM FOR A REPRESENTATIVE ESTUARINE SITE IN NARRAGANSETT
      BAY, RHODE ISLAND. THESE STUDIES WOULD BE AIMED AT SELECTING AND MONIT
     ORING REPRESENTATIVE IMPORTANT SPECIES. INHERENT VARIABILITY AND BIASES OF
     ANY GEAR USED WILL BE DETERMINED, SPECIFICALLY AS RELATES TO THE PROBLEM
     OF AVOIDANCE. PRELIMINARY STUDIES OF SMALL SCALE TEMPORAL AND SPATIAL
      VARIABILITY WILL BE CONDUCTED BEFORE ESTABLISHING ONGOING MONITOR
     ING PROGRAMS. THE STUDY PROPOSED HERE WILL SERVE AS THE FIRST PHASE OF THE
     MUCH LONGER DURATION PROGRAM IMPLIED ABOVE. THIS STUDY IS AIMED
     PRIMARILY AT UNDERSTANDING THE BIASES AND VARIABILITY INHERENT IN ICHTHYOP
     LANKTON SAMPLING. PRESENTLY ACCEPTED STANDARD ICHTHYOPLANKTON GEAR WILL BE
     USED TO THE GREATEST EXTENT POSSIBLE TO PERMIT COMPARISONS WITH PAST AND
     ONGOING STUDIES.
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804232

Work involves a $1.6 million restoration project for eutrophic Lake Lansing, used by 500,000 people. Major objectives include: testing and monitoring effective innovative dredging methods including new cutter heads, hydraulic head loss and consolidation rates for marl, peat, etc. Methods of reducing return to lake of silt and nutrients. Prepare cost curves on dredging process including size, depth, lake location, spoil areas, etc. and do likewise for a rational assessment formula to aid future engineers and contractors. These are to determine economics of storing dry peat and marl for agricultural resale. Demonstrate sandy beaches construction and also document the relationship of dredging to improvement of water quality.

The approach entails superimposing an evaluation program into an innovative dredging program for Lake Lansing. As dredging proceeds, appropriate physical and chemical monitoring would be made using in-house laboratory and soils equipment. Principal investigator will prepare plans and specifications, take bids and then give detailed resident project supervision concurrent and in part with the same personnel, evaluating the project. The project would take 6 months for final plans, 18 months for construction plus 6 months for evaluation report.

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BAGHOUSE STUDY AS AN EMISSION CONTROL ON A SOLID WASTE INCINERATOR
BOILER
   START/ COMPL DATE :     05/76 - 08/78 : FUNDING : EST. - FY   77  / $   67079
    TASK/EPA CODE :F624A-058    / R804233     (GRANT)  PRIOR  FY76 / $   650001
   PROJECT OFFICER : J M  TURNER
   INVESTIGATORS :    B   MCDERMOTT                   NASHVILLE THERMAL TRANSFER CO
   MILE: 05/76 -GRANT AWARD
         09/77 -REPORT ON PRELIMINARY PERFORMANCE RESULTS
         09/78 -FINAL REPORT
     DETERMINE APPLICABILITY AND PERFORMANCE FOR PILOT BAGHOUSE ON WASTE TO ENE
     RGY MUNICIPAL INCINERATOR. OPERATE PILOT BAGHOUSES ON INCINERATOR FLUE GAS
      FOR ONE YEAR TEST PERIOD. OBTAIN PERFORMANCE AND DURABILITY DATA ON
     TWO OR THREE BAG STYLES (TEFLON, GLASS). PRELIMINARY PERFORMANCE TESTING
      ACCOMPLISHED; ENDURANCE TESTING YET TO BE STARTED.
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AIR POLLUTION AND CARDIOPULMONARY FUNCTIONS

START/ COMPL DATE :   10/76 - 10/78 : FUNDING : EST. - FY   77 / $ 154000
TASK/EPA CODE :H625F-7166   / R804256   (GRANT) PRIOR FY76 / $ 1620001
PROJECT OFFICER : W B RIGGAN
INVESTIGATORS :   R A MOSTARDI   UNIV. OF AKRON
B L RICHARDSON   UNIV. OF AKRON
G A ATWOOD   UNIV. OF AKRON
MILE: 11/76 -GRANT AWARD
11/78 -PROGRESS REPORT
11/79 -FINAL REPORT

THE BASIC STRUCTURE OF THIS EXPERIMENTAL DESIGN IS TO EXAMINE THE EFFECTS OF AIR POLLUTION ON VARIOUS CARDIOPULMONARY PARAMETERS. THE DESIGN WILL INVOLVE BOTH LONGITUDINAL AND CROSS-SECTIONAL APPLICATIONS AND INCLUDE A NUMBER OF AGE GROUPS. THREE GEOGRAPHIC LOCATIONS WILL BE SELECTED AND INCLUDE: 1) AN AREA OF HEAVY POPULATION, 2) AN AREA OF INTERMEDIATE OR VARYING POPULATION, 3) A CLEAN AREA. IN EACH OF THE AREAS A MINIMUM OF 150 VOLUNTEERS WITHIN EACH AGE GROUP WILL BE TESTED. THE VARIOUS TESTS WHICH WILL BE CONDUCTED AND OTHER DATA COLLECTED INCLUDE: 1) VITAL DATA, 2) PULMONARY FUNCTION TESTING, 3) MAXIMAL EXPIRATORY FLOW VOLUME CURVES, 4) MULTIPLE-LOAD EXERCISE TEST, 5) ALPHA-1-ANTITRYPSIN, 6) METHEMOGLOBIN, 7) CARBOXYHEMOGLOBIN, 8) MERCURY AND CADMIUM IN BLOOD, 9) MERCURY AND ARSENIC IN URINE, 10) TRACE METALS IN HAIR, 11) QUESTIONNAIRE COMPLETION. AEROMETRIC MONITORING WILL BE CARRIED OUT AT MULTIPLE SITES WITHIN EACH OF THE THREE AREAS AND WILL INCLUDE: 1) TOTAL SUSPENDED PARTICULATE, 2) SO2, 3) NOX, 4) HYDROCARBONS, 5) OZONE, 6) TRACE METALS, 7) METEROLOGICAL DATA. THE DATA COLLECTED WILL BE ANALYZED AMONG AND BETWEEN THE AGE GROUPS USING MULTIPLE LINEAR REGRESSION AND ANALYSIS OF VARIANCE MODELS.

II-150

RECOVERY STUDIES OF PESTICIDES FROM SURFACE WATERS

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START/ COMPL DATE :    03/76 - 03/78 : FUNDING : EST. - FY   77  / $   24946
 TASK/EPA CODE :A614E-17     / R804294-01  (GRANT)  PRIOR  FY   /          1
PROJECT OFFICER : J J  LICHTENBERG
INVESTIGATORS :    T F MCGRATH                      SUSQUEHANNA UNIVERSITY
  THE STUDY WILL DETERMINE ACCURACY AND PRECISION DATA FOR A VARIETY OF
  PESTICIDES IN SURFACE AND DRINKING WATER. THE OFFICIAL EPA METHOD USING
  LIQUID-LIQUID EXTRACTION AND GAS CHROMATOGRAPHIC TECHNIQUES WILL BE
  EMPLOYED.
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804303

This project is designed to develop the necessary modifications and changes in interpretations of western water laws that will facilitate the implementation of improved water management technologies thereby reducing and controlling salinity and other forms of water pollution resulting from the exercise of irrigation water rights. To accomplish this goal, four major objectives will be satisfied:

1) Describe and define the legal aspects of water quality control programs relevant to irrigated agriculture for the seventeen western states to include: (a) statutes; (b) regulations; and (c) implementing machinery.

2) Describe the degree of interface of the law between: (a) water quantity allocation and management; and (b) water quality control.

3) Relate the characteristics of the physical irrigation system (which consists of three subsystems - water delivery, farm and water removal) and appropriate technological solutions for achieving irrigation return flow quality control to the legal system (which consists of both legal parameters - water quantity and water quality) for each of the seventeen western states.

4) Prepare modifications or enactments for either or both parameters of the legal system in order to achieve irrigation return flow quality control.

The analytical approach, after collection and assimilating material on western states water quality laws and programs (the material on state water quantity laws is already available), is first to describe in general the legal system (both water quantity, and water quality) in each state, and second, to structure the legal system of each state at the three sublevels of an irrigation system

II-152

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BIOLOGICAL EVALUATION OF THE BENEFITS OF MAINTAINING A CHLORINE RESIDUAL
 IN PUBLIC WATER
   START/ COMPL DATE :    07/76 - 06/78 : FUNDING : EST, - FY   77  / $   64549
    TASK/EPA CODE :C614A-7182   / R804307-02  (GRANT)  PRIOR  FY76 / $   765931
   PROJECT OFFICER : M J  ALLEN
   INVESTIGATORS :    C W KRUSE                         JOHNS HOPKINS UNIVERSITY
                      K   KAWATA                        JOHNS HOPKINS UNIVERSITY
                      V P OLIVIERI                      JOHNS HOPKINS UNIVERSITY
   MILE: 07/76 -PROJECT START
         07/77 -CONTINUATION FUNDING PACKAGE PROCESSED
         10/77 -INTERIM REPORT PUBLISHED
         06/78 -PROJECT COMPLETION
         09/78 -FINAL REPORT
     THE OBJECTIVES OF THIS STUDY ARE TO EVALUATE THE KIND AND CONCENTRATION OF
      CHLORINE RESIDUAL THAT MUST BE MAINTAINED IN THE DISTRIBUTION SYSTEM
     TO NEUTRALIZE SIGNIFICANTLY THE PATHOGENIC ORGANISMS INTRODUCED THROUGH D
     EFECTS, LABORATORY EXPERIMENTS WILL BE CONDUCTED UTILIZING BACTERIA, VIRUS
     AND CYST MODELS IN SIMULATED DISTRIBUTION SYSTEMS, THESE ORGANISMS WILL
     BE ASSAYED FOR SURVIVAL UNDER CONDITIONS OF VARYING CONCENTRATIONS OF F
     REE AND COMBINED CHLORINE, FIELD EVALUATIONS WILL ALSO BE MADE WITH LONG T
     ERM, LARGE VOLUME SAMPLING OF WATER FROM DISTRIBUTION SYSTEM WITH AND WITH
     OUT FREE RESIDUAL CHLORINE, CHLORINE RESIDUAL DETERMINATIONS AND TOTAL AND
      FECAL COLIFORM ASSAYS WILL BE DONE, THE STUDY WILL, OF NECESSITY,
     INCLUDE EVALUATION OF CULTURE TECHNIQUES AND MATERIALS,
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PATHOPHYSIOLOGY OF CO EXPOSURE IN ISCHEMIC HEART DISEASE

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START/ COMPL DATE :    05/76 - 12/79 : FUNDING : EST. - FY   77  / $  119200
 TASK/EPA CODE :H601C-7222   / R804316     (GRANT)  PRIOR  FY76 / $  1970001
PROJECT OFFICER : M T  WAGNER
INVESTIGATORS :   L P MCLAURIN                     UNIV. OF NORTH CAROLINA
                  J R FOSTER                       UNIV. OF NORTH CAROLINA
MILE: 05/76 -GRANT AWARD; OBTAIN SUPPLIES AND EQUIPMENT
      10/76 -INITIATE PILOT EXPERIMENTS
      07/77 -SUBMIT REPORT OF PILOT STUDIES
      07/77 -INITIATE DOG STUDIES
      01/78 -PRELIMINARY REPORT ON DOG DATA
      07/78 -INITIATE HUMAN STUDIES
      01/79 -FINAL REPORT ON DOG DATA
      04/79 -FINAL REPORT ON HUMAN EXPOSURES
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THE PURPOSE OF THIS INVESTIGATION WILL BE FURTHER ASSESSMENT OF THE ROLE OF CARBON MONOXIDE (CO) AS AN AGGRAVATING FACTOR IN THE PATHOPHYSIOLOGY OF ISCHEMIC HEART DISEASE AND ACUTE MYOCARDIAL INFARCTION. ANIMAL STUDIES ASSESSING THE EFFECT OF GRADED EXPOSURE TO LOW LEVELS OF CO ON REGIONAL MYOCARDIAL BLOOD FLOW, TISSUE OXYGENATION, AND LEFT VENTRICULAR FUNCTION ARE PLANNED. FURTHER STUDIES ON VENTRICULAR FIBRILLATION THRESHHOLD AND THE GENESIS OF ARRHYTHMIAS WILL BE PERFORMED. HUMAN STUDIES INCLUDE ASSESSMENT OF CO AS A FACTOR LIMITING EXERCISE PERFORMANCE, AGGRAVATING ARRHYTHMIAS AND COMPROMISING LEFT VENTRICULAR FUNCTION WILL BE CARRIED OUT. A LONG-TERM STUDY OF THE RELATIONSHIP OF CARBOXYHEMOGLOBIN LEVEL TO MYOCARDIAL INFARCTION SIZE, MORBIDITY, AND MORTALITY FROM ACUTE MYOCARDIAL INFARCTION IS BEING UNDERTAKEN IN CONJUNCTION WITH THE AREA EMERGENCY MEDICAL SERVICES AND THE OFFICE OF THE STATE MEDICAL EXAMINER.

II-154

TECHNICAL AND ECONOMIC EVALUATION OF BATEA GUIDELINES - TEXTILES

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START/ COMPL DATE :     01/76 - 01/79 : FUNDING : EST. - FY   77  / $  238000
 TASK/EPA CODE :F6105-04      / R804329     (GRANT)  PRIOR  FY76 / $  3400001
PROJECT OFFICER : M     SAMFIELD
INVESTIGATORS :    D    NILES                    AMER. TEXTILE MANUFACT. INST.
                   W A  STOREY                   AMER. TEXTILE MANUFACT. INST.
                   T    SARGENT                  AMER. TEXTILE MANUFACT. INST.
MILE: 03/76 -SEND OUT RFP'S
      05/76 -SELECT CONTRACTOR
      07/76 -WORK PLAN AND ORGANIZATION CHART
      09/76 -QUALITY ASSURANCE MANUAL
      12/76 -DESIGN OF MOBILE UNITS
      04/77 -MOBILE UNIT CONSTRUCTION COMPLETE
      05/77 -TESTING OF PLANTS BEGIN
      10/78 -TESTING OF PLANTS COMPLETE
      12/78 -ECONOMIC ANALYSIS COMPLETE
      02/79 -REPORT COMPLETE
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THE OBJECTIVE IS TO EVALUATE THE TREATMENT EFFICIENCY OF TECHNOLOGICAL PROCESSES DEFINED BY EPA AS BATEA FOR THE TEXTILE INDUSTRY AND TO EVALUATE THE ECONOMIC ACHIEVABILITY AND IMPACT ON THE INDUSTRY RESULTING FROM THE APPLICATION OF THE TECHNOLOGIES. APPROACH IS THE CONSTRUCTION OF TWO MOBILE PILOT UNITS TO USE IN TESTING SIX DIFFERENT TECHNOLOGIES ON TWENTY-FOUR TEXTILE PLANTS REPRESENTING EACH OF THE SEVEN TEXTILE CATEGORIES LISTED IN THE FEDERAL REGISTER. THESE WILL BE ADD-ON TECHNOLOGIES (TERTIARY TREATMENT) FOR PLANTS HAVING SECONDARY TREATMENT SYSTEMS AND WHICH ALREADY MEET BPT REGULATIONS. OUTPUT IS TECHNOLOGY TRANSFER BOTH TO THE INDUSTRY AT LARGE AND THE INDIVIDUAL PLANTS.

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A COMPARISON OF FOUR DAIRY MANURE MANAGEMENT SYSTEMS

   START/ COMPL DATE :    02/76 - 02/79 : FUNDING : EST. - FY   77  / $   33299
    TASK/EPA CODE :L617D-33      / R804349     (GRANT)  PRIOR  FY76 / $   989011
   PROJECT OFFICER : S C  YIN
   INVESTIGATORS :    R D MARTIN                          AGWAY INCORPORATED
   MILE: 02/76 -PROJECT INITIATION
         02/79 -FINAL REPORT PUBLICATION
    OBJECTIVES: THIS PROJECT WILL STUDY AND COMPARE FOUR DIFFERENT MANAGEMENT
    SYSTEMS FOR DAIRY MANURE OVER A 3-YEAR PERIOD. TOTAL COST, ENERGY USE,
    NUTRIENT LOSS, EFFICIENCY OF NUTRIENT UTILIZATION FOR CORN PRODUCTION, AND
    ENVIRONMENTAL EFFECTS OF EACH SYSTEM WILL BE COMPARED FROM THE DATA COLL
    ECTED DURING THIS STUDY PERIOD. APPROACH: FIVE 3-ACRE TREATMENT AREAS WILL
    BE UTILIZED WITH ONE DEFINED MANURE MANAGEMENT SYSTEM ASSIGNED TO EACH
    AREA. OUTPUT: FINAL PROJECT REPORT.
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II-156

(1) Objectives: To provide professional and technical assistance; to disseminate information on all aspects of solid waste management; to provide timely input to EPA on programs, regulations, guidelines, and legislation; to facilitate the sharing of information on solid waste management between cities; to provide information to EPA on successful solid waste practices and the degree to which they exist.

(2) Approach: (a) Three group technical assistance working sessions will be held; (b) ICMA will publish three issues of Refuse Report, a newsletter of the latest happenings in solid waste management; (c) four technical assistance transfer team visits will occur responding to cities with specialized needs; (d) a special index on solid waste practices and resources will be developed; (e) ICMA's solid waste clearinghouse will be further developed and expanded.

II-157

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OPTICAL DETECTION OF ASBESTIFORM PARTICLES IN FINISHED DULUTH DRINKING
WATER
   START/ COMPL DATE :    03/77 - 03/78 : FUNDING : EST, - FY   77  / $   57000
    TASK/EPA CODE :C614 -7155   / R804361-02  (GRANT)  PRIOR  FY76 / $   570001
   PROJECT OFFICER : G S  LOGSDON
   INVESTIGATORS :   M    SYDOR                        UNIV, OF MINNESOTA
                     T F  JORDAN                       UNIV, OF MINNESOTA
                     S    DIEHL                        UNIV, OF MINNESOTA
                     K    STORTZ                       UNIV, OF MINNESOTA
                     D    SMITH                        UNIV, OF MINNESOTA
   MILE: 03/76 -AWARD GRANT
         04/77 -ANNUAL REPORT
         06/78 -PROJECT REPORT
     WE WISH TO IDENTIFY THE SIGNATURE DUE TO OPTICAL SCATTERING OF INDIVIDUAL
     AMPHIBOLE AND CHRYSOTILE FIBERS IN WATER SAMPLES, AND TO USE THE S
     CATTERING SIGNATURE IN AN EXPERIMENT TO DETERMINE THE CONCENTRATION OF THE
     CONTAMINANTS IN FILTERED WATER.
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ASBESTOS IN DOMESTIC WATER SUPPLIES AND CANCER INCIDENCE IN FIVE
CALIFORNIA COUNTIES
   START/ COMPL DATE :    05/77 - 05/78 : FUNDING : EST. - FY   77  / $  122400
    TASK/EPA CODE :D614B-081    / R804366-02  (GRANT)  PRIOR  FY76 / $   840911
   PROJECT OFFICER : L J  MCCABE
   INVESTIGATORS :   R C COUPER                         UNIV. OF CALIFORNIA
                     J C MURCHIO                        UNIV. OF CALIFORNIA
                     R S PAFFENBARGER                   UNIV. OF CALIFORNIA
   MILE: 04/77 -ANNUAL REPORT
         04/78 -FINAL REPORT
     THE OBJECTIVE OF THE PROJECT IS TO DETERMINE THE ASSOCIATION BETWEEN THE
     PRESENCE OF ASBESTOS FIBERS IN DRINKING WATER AND THE INCIDENCE OF CANCER
     IN THE POPULATION SERVED BY SUCH WATER SUPPLIES. THE STUDY WILL BE DIVIDED
      INTO THREE OVERLAPPING PHASES: THE FIRST PHASE DEALS WITH THE IDENT
     IFICATION AND DESCRIPTION OF SAN FRANCISCO BAY AREA WATERSHED AND WATER DI
     STRIBUTION SYSTEMS, WHICH WILL INCLUDE: THE SITE OF WATER SOURCES, THEIR G
     EOMORPHIC COMPOSITION, GEO-POLITICAL AREA SERVED, METHOD OF WATER TREATMEN
     T AND MEANS OF DISTRIBUTION. THE SECOND PHASE WILL BE DIRECTED TOWARDS THE
      DETERMINATION OF NUMBER, SIZE AND TYPE OF ASBESTOS FIBERS PRESENT
      IN THE VARIOUS WATER SUPPLIES BEFORE AND AFTER TREATMENT AND AFTER
     DISTRIBUTION. THE THIRD PHASE WILL INVOLVE A TABULATION OF TUMOR INCIDEN
     CE AND CANCER MORTALITY DATA FROM THE 3RD NATIONAL CANCER SURVEY CONDUCTED
      IN THE FIVE SAN FRANCISCO BAY AREA COUNTIES UNDER CONSIDERATION. CORR
     ELATIONS BETWEEN THE OBSERVED OCCURRENCE OF ASBESTOS IN DRINKING WATER AND
     THE INCIDENCE OF HUMAN CANCER WILL BE DETERMINED USING THE
     INFORMATION GATHERED IN THE THREE PHASES OF THIS STUDY.
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II-159

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DEMONSTRATION OF ULTRAFILTRATION AND CARBON ADSORPTION FOR TREATMENT OF
INDUSTRIAL LAUNDRY WASTEWATER
   START/ COMPL DATE :     01/76 - 09/78 : FUNDING : EST. - FY   77  / $   20000
    TASK/EPA CODE :B6108-050    / S804367-01  (GRANT)  PRIOR  FY76 / $  1300001
   PROJECT OFFICER : R J  TURNER
   INVESTIGATORS :   M    SLUIZER                     INST. OF INDUSTRIAL LAUNDERER
                     A    GOLLAN                      ABCOR INCORPORATED
   MILE: 09/75 -FUNDING PACKAGE SUBMITTED
         01/76 -AWARD FUNDS FOR PROJECT
         03/78 -END OF PROJECT PERIOD
         06/78 -DRAFT FINAL REPORT
         09/78 -RECEIVED FINAL REPORT
     THE PURPOSE OF THIS PROGRAM IS TO INVESTIGATE ON A PILOT SCALE THE EFFECT
     IVENESS OF ULTRAFILTRATION (UF) AND CARBON ADSORPTION FOR THE TREATMENT OF
      INDUSTRIAL LAUNDERING WASTEWATERS. A FIELD DEMONSTRATION SYSTEM
     WITH A NOMINAL CAPACITY OF 5000 GPD WILL BE OPERATED FOR A FOUR-MONTH
     PERIOD ON ACTUAL LAUNDERING EFFLUENT. THE SYSTEM WILL UTILIZE FULL-SIZE
     SPIRAL WOUND ULTRAFILTRATION MEMBRANE MODULES. THE UF PERMEATE WILL BE
     FURTHER TESTED BY PASSAGE THROUGH A 2" DIAMETER CARBON COLUMN. THE PROJ
     ECT WILL ESTABLISH THE UF/CARBON ADSORPTION SYSTEM'S ECONOMICS, EFFICIENCY
     OF REMOVAL AND OPTIMUM OPERATING CONDITIONS. THE ECONOMICS FOR
     FULL-SCALE SYSTEMS OF VARYING DAILY CAPACITIES WILL BE DETERMINED. ALSO
     DURING THIS PROGRAM, THE POSSIBLE PRESENCE AND FATE (AFTER UF/CARBON) OF
      TOXIC SUBSTANCES IN INDUSTRIAL LAUNDERING WASTEWATER WILL BE
     INVESTIGATED. THESE STUDIES WILL BE BASED ON THE EPA LISTING OF 65 TOXIC
     SUBSTANCES. ANALYSES WILL BE PERFORMED BY GC/MS, SPARK SOURCE MS AND A.A.
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II-160

EFFECTIVENESS OF ACTIVATED CARBON FOR REMOVAL OF TOXIC AND/OR CARCINOGENIC COMPOUNDS FROM WATER SUPPLIES

START/ COMPL DATE : 04/76 - 07/79 : FUNDING : EST. - FY 77 / $ 99158
TASK/EPA CODE :C614 -7172 / R804369-02 (GRANT) PRIOR FY76 / $ 1000001
PROJECT OFFICER : A STEVENS
INVESTIGATORS : W J WEBER UNIV. OF MICHIGAN
MILE: 04/76 -GRANT AWARDED
07/77 -INTERIM REPORT
07/78 -INTERIM REPORT
07/79 -PROJECT COMPLETED AND FINAL REPORT PUBLISHED

THE COMPLEX PROBLEM OF TRACE ORGANICS CONTAMINANTS IN WATER SUPPLIES CAN BE BROADLY DIVIDED INTO TWO MAJOR CATEGORIES: 1) NATURALLY OCCURRING ORGANIC SUBSTANCES THAT ARE TRANSFORMED TO POTENTIALLY MORE HARMFUL SPECIES BY WATER TREATMENT OPERATIONS SUCH AS CHLORINATION; AND, 2) COMPOUNDS OF INDUSTRIAL, AGRICULTURAL, AND OTHER MAN-RELATED ORIGIN THAT ARE NOW INDIGENOUS TO MANY RAW WATER SUPPLIES AND WHICH RESIST REMOVAL BY CONVENTIONAL WATER TREATMENT PRACTICE. SUBSTANTIAL EFFORT IS BEING DIRECTED BY THE U.S.E.P.A. TO RESOLUTION OF PROBLEMS ASSOCIATED WITH THE FIRST CATEGORY OF COMPOUNDS; ONE POTENTIAL SOLUTION IS TO USE ACTIVATED CARBON TREATMENT IN ADVANCE OF CHLORINATION TO ELIMINATE THE PRECURSOR COMPOUNDS. THE PROPOSED RESEARCH WILL BE DIRECTED TO REMOVAL OF THE SECOND CATEGORY OF CONTAMINANTS, TO AN EVALUATION OF THE COMPETITIVE EFFECTS THAT NATURALLY OCCURRING ORGANICS HAVE ON THE EFFECTIVENESS OF CARBON FOR REMOVAL OF THE SECOND CATEGORY OF CONTAMINANTS ON A LONG TERM CONTINUOUS BASIS, TO THE EFFECTS THAT OTHER MAJOR WATER TREATMENT OPERATIONS HAVE ON THIS EFFECTIVENESS, AND TO QUANTIFICATION OF THE ASSOCIATED ADSORPTION DYNAMICS TO FACILITATE OPTIMUM DESIGN AND APPLICATION METHODOLOGY.

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MONITORING FOR PATHOGENIC NAEGLERIA

    START/ COMPL DATE :    05/76 - 04/78 : FUNDING : EST. - FY   77  / $   84000
     TASK/EPA CODE :D607A-012    / R804375-02  (GRANT)  PRIOR  FY76 / $   763001
    PROJECT OFFICER : W     JAKUBOWSKI
    INVESTIGATORS :    F M WELLINGS                        STATE OFF. OF LAB. SERVICES
                       A L LEWIS                           STATE OFF. OF LAB. SERVICES
    MILE: 05/78 -FINAL REPORT
      THE OBJECTIVE OF THIS CONTINUATION GRANT IS TO DEFINE THE DISTRIBUTION OF
      PATHOGENIC NAEGLERIA IN THE STATE OF FLORIDA. MULTIPLE ISOLATES HAVE B
      EEN MADE FROM FRESHWATER LAKES AS WELL AS A THERMALLY POLLUTED ONE. OVERWI
      NTERING APPEARS TO BE CONFINED TO LAKE BOTTOM SANDS AND/OR SEDIMENTS. OVER
      THE NEXT YEAR THIS ASPECT WILL BE OR SHOULD BE CONFIRMED. A RAPID METHOD
      FOR IDENTIFICATION HAS BEEN DEVELOPED BUT REQUIRES ADDITIONAL TESTING
      THE SPECIMENS FROM VARIOUS AREAS. IMMUNOLOGICAL AND PHYSICOCHEMICAL
      ASPECTS OF PATHOGENIC NAEGLERIA AND SEROPOSITIVE NONPATHOGENIC NAEGLERIA
      WILL BE INVESTIGATED TO DETERMINE THEIR RELATIONSHIP.
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804376

II-162

Rapid quantitative determination of beryllium via proton scattering will be investigated as a function of both scattering angle and bombarding energy. Simultaneous observation of other elements using wavelength dispersive X-ray analysis will also be evaluated. Extension of the X-ray technique in order to determine oxidation states by measurement of chemical shifts and differential population of satellite lines will be examined.

DEVELOP PATTERN RECOGNITION COMPUTER PROGRAM AND DATA BANK FOR GAS PHASE FTIR SPECTRA

START/ COMPL DATE : 01/76 - 11/78 : FUNDING : EST. - FY 77 / \$ 113000
TASK/EPA CODE :K7138-122 / R804381 (GRANT) PRIOR FY76 / \$ 638001
PROJECT OFFICER : L V AZARRAGA
INVESTIGATORS : T ISENHOUR UNIV. OF NORTH CAROLINA
J MARSHALL UNIV. OF NORTH CAROLINA
MILE: 01/76 -AWARD GRANT
01/78 -DELIVER WORKING PROGRAM AND FINAL REPORT

TO FACILITATE IDENTIFICATION OF ORGANIC POLLUTANTS BY FOURIER TRANSFORM SPECTROSCOPY (FTIR), A GRANTEE WILL DEVELOP A COMPUTER PROGRAM FOR CHARACTERIZATION OF ORGANIC MOLECULES BY PATTERN RECOGNITION OF INFRARED SPECTRA. THE PROGRAM WILL BE DESIGNED TO FUNCTION ON THE GCFTIR SYSTEM'S DEDICATED COMPUTER. CURRENT COLLECTIONS CONTAIN CONDENSED PHASE IR SPECTRA. BECAUSE THESE SPECTRA DO NOT CORRESPOND TO GAS PHASE SPECTRA, A DATA BASE OF GAS PHASE IR REFERENCE SPECTRA WILL BE COMPILED. THE COMPUTER PROGRAM AND DATA BASE, WHICH WILL BE EXPANDED IN THIS SECOND YEAR OF THE GRANT, WILL BE USED TO DEVELOP TECHNIQUES TO IDENTIFY ORGANIC ENVIRONMENTAL POLLUTANTS.

STATUS OF OZONATION AND CHLORINE DIOXIDE TECHNOLOGIES FOR TREATMENT OF MUNICIPAL WATER SUPPLIES

START/ COMPL DATE : 06/76 - 11/77 : FUNDING : EST. - FY 77 / $ 12000
TASK/EPA CODE :C614 -7140 / R804385-01 (GRANT) PRIOR FY76 / $ 99573
PROJECT OFFICER : J K CARSWELL
INVESTIGATORS : G W MILER PUBLIC TECHNOLOGY INCORPORATE
D H HOUCK PUBLIC TECHNOLOGY INCORPORATE
MILE: 05/76 -PACKAGE PROCESSED
06/76 -GRANT AWARDED
11/77 -PROJECT COMPLETED
01/78 -FINAL REPORT PUBLISHED

PUBLIC TECHNOLOGY, INC., IN COOPERATION WITH THE AMERICAN WATER WORKS ASSOCIATION RESEARCH FOUNDATION AND THE NATIONAL WATER WELL ASSOCIATION, WILL CONDUCT A FACT FINDING, STATE-OF-THE-ART SURVEY OF MUNICIPAL WATER TREATMENT PRACTICES INVOLVING THE USE OF OZONE AND CHLORINE DIOXIDE OVERSEAS, IN CANADA, AND THOSE INSTALLATIONS THAT ARE OPERATING IN THE UNITED STATES. THE OBJECTIVES ARE TO DOCUMENT SPECIFIC DATA ON THE KNOWN APPLICATION OF OZONE AND CHLORINE DIOXIDE FOR DRINKING WATER TREATMENT, INCLUDING DATA ON ENGINEERING DESIGN, EFFECTIVENESS, HEALTH AND SAFETY ASPECTS, AND COSTS OF USE OF BOTH CHEMICALS. FOR OZONE, SPECIFIC EMPHASIS WILL BE PLACED ON DOCUMENTING WHAT IS CURRENTLY KNOWN AND PRACTICED ON THE USE OF OZONE FOR REMOVING DISSOLVED ORGANIC MATERIALS PRIOR TO THE DISINFECTION STEP, AND ON IDENTIFICATION OF OXIDATION PRODUCTS FORMED BY TREATMENT WITH OZONE. IN THE CASE OF CHLORINE DIOXIDE, INFORMATION WILL BE GATHERED RELATED TO COSTS, METHODS OF APPLICATION, PROBLEMS, SUCCESSES, METHODS OF ANALYSIS, AND BY-PRODUCT FORMATION. ALSO, A COMPILATION OF PLANTS THAT USE C/O2 BOTH AS A DISINFECTANT AND FOR TASTE AND ODOR CONTROL WILL BE MADE. THE PROJECT WILL BE ONE YEAR IN DURATION AND WILL CONSIST OF IDENTIFYING EXISTING FACILITIES WORLDWIDE CURRENTLY EMPLOYING OZONATION OR CHLORINE DIOXIDE AS PART OF THEIR WATER TREATMENT PROCESS. INFORMATION WILL BE GATHERED BY QUESTIONNAIRE AND BY SITE VISITS TO SELECTED FACILITIES IN EUROPE, CANADA, JAPAN, AND THE UNITED STATES.

HALOGENATED MATERIALS IN AN URBANIZED WATER SUPPLY

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    START/ COMPL DATE :    05/76 - 04/78 : FUNDING : EST. - FY   77  / $   62595
     TASK/EPA CODE :C614 -7175   / R804394-02  (GRANT)  PRIOR  FY76 / $   300001
    PROJECT OFFICER : A A  STEVENS
    INVESTIGATORS :    J V HUNTER                     RUTGERS THE STATE UNIVERSITY
                           SABATINO                   RUTGERS THE STATE UNIVERSITY
    MILE: 05/76 -GRANT AWARDED
          05/77 -INTERIM REPORT
          05/78 -PROJECT COMPLETED
          08/78 -FINAL REPORT PUBLISHED
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THE OBJECTIVES OF THIS CONTINUING STUDY ARE TO DETERMINE THE NATURE AND CONCENTRATIONS OF THE HALOGENATED ORGANICS ALREADY PRESENT IN THE WATER SUPPLY AND HOW THESE ARE INFLUENCED BY CHLORINATION, AND TO EVALUATE THE RELATIVE IMPORTANCE THE VARIOUS SOURCES OF BOTH HALOGENATED AND HALOGENATABLE ORGANICS AS THEY EFFECT THE DRINKING WATER SUPPLY. THE RIVER SELECTED IS THE PASSAIC RIVER IN NORTHERN NEW JERSEY WHICH IS A WATER SUPPLY SOURCE BUT RECEIVES SIGNIFICANT POLLUTANTS.

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STUDIES TO IMPROVE THE RELIABILITY AND SENSITIVITY OF BACTERIAL
MUTAGENESIS AS A SCREEN FOR ENVIRONMENTAL CARCINOGENS
   START/ COMPL DATE :    04/76 - 04/79 : FUNDING : EST. - FY   77  / $  100000
    TASK/EPA CODE :H629A-7911   / R804395-02  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : M    WATERS
   INVESTIGATORS :   B   COMMONER                   WASHINGTON UNIVERSITY
                     A   VITHAYATHIL                WASHINGTON UNIVERSITY
                     M   KEMARYRSKY                 WASHINGTON UNIVERSITY
                     S   HAIR                       WASHINGTON UNIVERSITY
                     M D WATERS                     U.S. ENVIRON. PROTECTION AGCY
   MILE: 07/77 -REPORT ON THE USE OF THE SALMONELLA TYPHIUMURIUM LIQUID SUSPENS
         08/77 -REPORT ON THE MICROSOMAL EFFECT WITH STRAIN IA 1538
         01/78 -REPORT ON PRELIMINARY RESULTS OF MUTAGENESIS SCREENING OF URINE
     OBJECTIVES: THE PROPOSED PROGRAM OF RESEARCH IS DESIGNED TO IMPROVE THE
     RELIABILITY AND SENSITIVITY OF THE BACTERIAL MUTAGENESIS TECHNIQUES AS A
     SCREEN FOR THE DETECTION OF ENVIRONMENTAL CARCINOGENS. IN ORDER TO ACHIEVE
     THIS OBJECTIVE THE RESEARCH IS CONCENTRATING ON ELUCIDATING THE MECHANISM
     OF MICROSOMAL ACTIVATION WHICH OCCURS IN THIS TECHNIQUE AND OF IMPROVING
      THE SPECIFICITY OF THIS PROCESS. APPROACH: THE BASIC APPROACH
     EMPLOYED IN THIS RESEARCH PROGRAM IS TO ANALYZE THE BIOCHEMICAL MECHA
     NISMS INVOLVED IN MICROSOMAL ACTIVATION. CURRENT PLANS: CURRENT RESEARCH P
     LANS ARE DESIGNED TO ELUCIDATE FURTHER OUR RECENT DISCOVERY THAT MICROSOME
      PREPARATIONS ARE THEMSELVES CAPABLE OF INDUCING A SIGNIFICANT
     INCREASE IN THE MUTATION RATES OF TWO STRAINS OF SALMONELLA, TA-1533 AND
     TA-98. SPECIFICALLY, WE PLAN TO DESCRIBE THE BIOCHEMICAL PROCESSES CARRIED
     OUT BY THE MICROSOMES THAT MEDIATE THIS EFFECT AND THE SUBSTANCES IN THE
      BACTERIAL CELLS THAT ARE ACTED UPON.
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NUTRITIONAL ECOLOGY OF GREAT LAKES CLADOPHORA SP.

  START/ COMPL DATE :     05/76 - 05/78 : FUNDING : EST. - FY   77  / $   37456
   TASK/EPA CODE :N608A-036     / R804402       (GRANT)  PRIOR  FY76 / $   374911
  PROJECT OFFICER : N A  THOMAS
  INVESTIGATORS :   G C GERLOFF                            UNIV. OF WISCONSIN
  MILE: 05/77 -ANNUAL REPORT
        05/78 -FINAL REPORT
    THE PRIMARY OBJECTIVES OF THIS PROJECT ARE TO CARRY OUT LABORATORY STUDIES
     ON THE NUTRITIONAL REQUIREMENTS AND CHARACTERISTICS OF CLADOPHORA
    GLOMERATA, TO EVALUATE ITS NUTRITION UNDER FIELD CONDITIONS, AND TO
    UTILIZE THE RESULTS IN EXPLAINING THE OCCURRENCE OF NUISANCE CLADOPHORA GR
    OWTHS IN THE GREAT LAKES AND IN DEVELOPING MEASURES TO REDUCE THE GROWTHS.
    EMPHASIS IN THE LABORATORY ASPECTS WILL BE IN EVALUATING THE EFFECTI
    VENESS OF CLADOPHORA GLOMERATA IN COMPETING WITH DIATOMS AND OTHER ORGANIS
    MS FOR P AND OTHER NUTRIENTS LIKELY TO BE CRITICAL IN THE ABUNDANT GROWTHS
     OF C. GLOMERATA. C. GLOMERATA AND OTHER LAKE MICHIGAN ORGANISMS WILL BE
     GROWN IN MIXED CULTURES AND MADE TO COMPETE FOR GROWTH-LIMITING AMOUNTS
    OF CRITICAL NUTRIENTS. THE MINIMUM SOLUTION CONCENTRATIONS AT WHICH C.
    GLOMERATA CAN ABSORB ADEQUATE P AND OTHER KEY NUTRIENTS ALSO WILL BE E
    STABLISHED AND COMPARED WITH SIMILAR VALUES FOR OTHER COMPETING ORGANISMS.
    THE EMPHASIS IN THE FIELD WORK WILL BE TO ESTABLISH WHETHER THE AVAILABLE
    SUPPLY OF A SPECIFIC INORGANIC OR ORGANIC NUTRIENT IS A KEY FACTOR IN
     CONTROLLING NUISANCE CLADOPHORA GROWTHS IN LAKE MICHIGAN AND PARTICULARLY
     GREEN BAY. THESE EVALUATIONS WILL BE BY VARIOUS BIOLOGICAL ASSAYS
    WITH EMPHASIS ON THE TECHNIQUES OF PLANT ANALYSIS.
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UTILIZATION AND/OR STABILIZATION OF PYROLYTIC OIL FROM PYROLYSIS OF
AGRICULTURAL, MUNICIPAL AND OTHER WASTES

START/ COMPL DATE : 06/76 - 06/78 : FUNDING : EST. - FY 77 / $ 61750
TASK/EPA CODE :C624A-7034 / R804416-02 (GRANT) PRIOR FY76 / $ 650001
PROJECT OFFICER : C ROGERS
INVESTIGATORS : J A KNIGHT GEORGIA INST. OF TECHNOLOGY
L W ELSTON GEORGIA INST. OF TECHNOLOGY
D HURST GEORGIA INST. OF TECHNOLOGY

MILE: 06/77 -GRANT AWARDED
12/77 -INTERIM REPORT ON PHYSICAL PROCESSING OF PYROLYTIC OILS 2ND PRO
03/78 -COMPLETE BASIC PROCESS OPTIMIZATION
06/78 -GRANT COMPLETED
09/78 -FINAL REPORT

THE BROAD OBJECTIVE OF THIS PROGRAM IS TO MAXIMIZE THE VALUE OF PYROLYTIC OILS OBTAINED BY PYROLYSIS OF AGRICULTURAL, MUNICIPAL, FORESTRY AND OTHER WASTES SO THAT MAXIMUM RESOURCE RECOVERY AND ECONOMICAL UTILIZATION CAN BE REALIZED FROM THESE MATERIALS. IN ORDER TO ACCOMPLISH THIS OBJECTIVE, AN EXTENSIVE SEARCH AND DEVELOPMENT PROGRAM IS PROPOSED WHICH WILL DEVELOP A DATA BASE FOR EVALUATION OF THE OILS FOR USES OTHER THAN AS A FUEL. PYROLYTIC OILS HAVE POTENTIAL AS A SOURCE OF CHEMICALS, AS A CHEMICAL FEEDSTOCK, AND FOR SPECIALTY USES FOR SPECIFIC FRACTIONS OBTAINED FROM THE OILS. THIS PROGRAM WAS INITIATED JUNE 21, 1976, AND TO DATE, THE TECHNICAL LITERATURE HAS BEEN SURVEYED; A VARIETY OF DISTILLATION EXPERIMENTS HAVE BEEN CARRIED OUT WITH PYROLYTIC OIL PRODUCED FROM A CONTINUOUS LARGE SCALE PYROLYSIS OPERATION; AND A LARGE NUMBER OF BOTH PHYSICAL AND CHEMICAL TECHNIQUES AND METHODS HAVE BEEN UTILIZED IN CHARACTERIZING THE OIL AND OIL FRACTIONS. PARTICULAR ATTENTION HAS BEEN GIVEN TO LIQUID AND GAS CHROMATOGRAPHY AS TECHNIQUES FOR "FINGERPRINTING" THE OIL SAMPLES. DURING THE NEXT PROJECT PERIOD, THE MAJOR EMPHASIS OF THE RESEARCH WILL BE TO CONTINUE THE INVESTIGATION OF PROCESSING METHODS FOR PYROLYTIC OIL. BOTH PHYSICAL AND CHEMICAL METHODS WILL BE INVESTIGATED AND THESE INCLUDE EXTRACTION, COLUMN CHROMATOGRAPHY, HYDROGENATION AND THERMAL CRACKING. PYROLYTIC OIL WILL BE PRODUCED WITH A 6 INCH TUBE FURNACE UNDER CONTROLLED CONDITIONS FOR USE ON THE PROGRAM. CONCURRENT WITH THIS EFFORT, THE OIL PRODUCTS WILL BE CHARACTERIZED BY BOTH CHEMICAL AND PHYSICAL ANALYTICAL METHODS. LIQUID AND GAS CHROMATOGRAPHY WILL BE USED EXTENSIVELY AS ANALYTICAL TECHNIQUES. THE CURRENT LITERATURE WILL BE SEARCHED FOR TECHNICAL INFORMATION THAT IS RELEVANT TO THIS PROGRAM AND FOR ADDITION TO OUR LITERATURE BASE.

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PYROGENIC ACTIVITY OF CARBON-FILTERED WATERS

START/ COMPL DATE : 03/76 - 05/78 : FUNDING : EST. - FY 77 / $ 58999
TASK/EPA CODE :D6148-063 / R804420-02 (GRANT) PRIOR FY76 / $ 685901
PROJECT OFFICER : H R PAHREN
INVESTIGATORS : H W WOLF TEXAS A & M UNIVERSITY SYSTEM
F SLOWEY TEXAS A & M UNIVERSITY SYSTEM
MILE: 07/78 -COMPLETE STUDY

THE OBJECTIVES OF THIS PROPOSED RESEARCH ARE 1) TO QUANTIFY THE PYROGENIC ACTIVITY OF CARBON-FILTERED DRINKING WATER SUPPLIES, AND EVALUATE THIS ACTIVITY WITH RESPECT TO A) THE GRAM-NEGATIVE ENDOTOXIN CONTENT OF THE WATER AND B) THE TOTAL AND COLIFORM COUNTS OF THE WATER, AND 2) TO FURTHER STUDY THE INHALATION ROUTE OF ADMINISTRATION OF PYROGEN-CONTAINING AEROSOLS. THIS WILL BE ACCOMPLISHED BY 1) OBTAINING SAMPLES OF WATER FROM EXISTING WATER TREATMENT PLANTS THAT UTILIZE GRANULAR ACTIVATED CARBON BEDS IN THEIR TREATMENTS AND EXAMINING SAMPLES TAKEN BEFORE THE CARBON BED, IMMEDIATELY AFTER, AND AGAIN AFTER A DISINFECTING TREATMENT. PART 2) WILL BE ACCOMPLISHED BY EXPOSING TEST ANIMALS IN A DYNAMIC CHAMBER TO INTENSELY-LADEN PYROGEN-CONTAINING AEROSOLS THUS ALLOWING QUANTITATION OF EXPOSURES. CURRENT WORK USING HIGHLY TREATED WASTEWATER EFFLUENTS HAS DEMONSTRATED AN EXTREMELY HIGH CORRELATION OF GRAM-NEGATIVE ENDOTOXIN CONTENT WITH TOTAL COUNT, A DEFINITE DECREASE IN ENDOTOXIN CONTENT THROUGH THE CARBON ADSORPTION PROCESS, A GREATER DECREASE IN ENDOTOXIN CONTENT WHEN DISINFECTED BY HIGH-PH AND OZONE AS COMPARED TO CHLORINATION AND UV IRRADIATION, AND MIXED RESULTS ON ANIMALS WHICH ARE EXPOSED TO HIGH PYROGEN-CONTAINING WATERS VIA AEROSOL OR INGESTION ROUTES -- SUGGESTING A POSSIBLE DIFFERENCE OF RESPONSE AMONG INDIVIDUAL ANIMALS.

II-170

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SEATTLE TOLT WATER SUPPLY - MIXED ASBESTOS FORMS REMOVAL STUDY

   START/ COMPL DATE :    05/76 - 11/78 : FUNDING : EST. - FY   77  / $   66881
    TASK/EPA CODE :C614 -7156   / R804422-02  (GRANT)  PRIOR  FY76 / $   820001
   PROJECT OFFICER : G S  LOGSDON
   INVESTIGATORS :   J E COURCHENE
                     D L HARRISON                    SEATTLE WATER DEPARTMENT
                     B P HOYT                        SEATTLE WATER DEPARTMENT
                     G   KIRMEYER                    SEATTLE WATER DEPARTMENT
   MILE: 05/76 -AWARD GRANT                          SEATTLE WATER DEPARTMENT
         06/77 -ANNUAL REPORT
         11/78 -PROJECT COMPLETE
         03/79 -FINAL REPORT PUBLISHED
    TO DETERMINE THE MOST FEASIBLE METHOD OF REMOVAL OF NATURALLY OCCURRING
    MIXED AMPHIBOLE AND CHRYSOTILE ASBESTOS FORM FIBRES FROM A MAJOR S
    OURCE OF CITY OF SEATTLE WATER SUPPLY. TO EXTEND THE METHODOLOGY DEVELOPED
     IN DULUTH STUDY TO INCLUDE CHRYSOTILE REMOVAL BY MODIFICATIONS OF THE
     FILTERING TECHNIQUE SUCCESSFULLY DEVELOPED FOR REMOVAL OF AMPHIBOLE
    FIBRES. TO ACQUIRE PHYSICAL/PROFESSIONAL CAPABILITY TO CONDUCT
     PILOT PLANT STUDIES USING A SMALL PACKAGE PLANT AT THE SOURCE. THIS WILL
     REQUIRE THE ADDITION TO PROFESSIONAL STAFF TO COORDINATE EXISTING DE
    PARTMENT MANPOWER CAPABILITIES AND CAPITAL INVESTMENT FOR EQUIPMENT. SINCE
     DISCOVERY OF ASBESTOS IN TOLT SOURCE DURING A JOINT CITY/STATE EPA
    SURVEY, STUDIES HAVE BEEN CONTINUED BOTH JOINTLY AND INDEPENDENTLY
     BY THE CITY. SEATTLE IS CURRENTLY ENGAGED IN A WATERSHED SAMPLING AND
    ANALYSIS PROGRAM TO DEFINE AREAS OF NATURAL CONTRIBUTION AND TO
    DETERMINE IF ASBESTOS CONCENTRATION IS SUBJECT TO SEASONAL INFLUENCES.
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DEVELOPMENT OF MANAGEMENT MODELS FOR STREAM ECOSYSTEMS

START/ COMPL DATE :   04/76 - 04/78 : FUNDING : EST. - FY   77 / $ 50000
TASK/EPA CODE :K609A-403   / R804424   (GRANT) PRIOR FY76 / $ 1249741
PROJECT OFFICER : J W FALCO
INVESTIGATORS :   R H BOLING   MICHIGAN STATE UNIVERSITY
MILE: 04/76 -START OF GRANT
09/76 -DEVELOPMENT OF PRELIMINARY STREAM MODEL
01/77 -DEVELOPMENT OF FINAL PRIMARY STREAM MODEL
10/77 -INTERFACE PRIMARY STREAM MODEL WITH RIVER AND WATERSHED MODELS
04/78 -FINAL REPORT

THE OBJECTIVES OF THIS WORK ARE TO DEVELOP QUANTITATIVE PREDICTIVE MODELS OF WOODLAND STREAM ECOSYSTEMS FOR EFFECTIVE MANAGEMENT PROGRAMS AND TO DEVELOP A SUFFICIENT DATA BASE TO PARAMETERIZE THE MODELS AND PERMIT REASONABLE ESTIMATES OF SYSTEMS STATUS FROM DIRECTLY MEASURABLE STREAM VARIABLES. THE RESEARCH APPROACH INVOLVES THE MODIFICATION OF EXISTING MODELS FOR PLANNING APPLICATIONS. DATA REQUIRED FOR PARAMETER ESTIMATION WILL BE OBTAINED FROM LABORATORY MICROCOSM EXPERIMENTS, LITERATURE SURVEYS, AND FIELD STUDIES. THE DETAILED MODEL WILL BE CONDENSED TO PROVIDE A PLANNING MODEL REQUIRING A MINIMUM OF DATA FOR CALIBRATION. SUBMODELS DESCRIBING MERCURY AND MALATHION TRANSFORMATION KINETICS WILL BE INCORPORATED. A FINAL REPORT SUMMARIZING THE PROJECT WILL BE PREPARED AND SUBMITTED, ALONG WITH A DOCUMENTED DECK OF ALL COMPUTER PROGRAMS DEVELOPED. THE FINAL REPORT WILL CONTAIN INSTRUCTIONS DESCRIBING THE OPERATION AND INPUT REQUIREMENTS OF THE PLANNING MODEL.

EFFECTS OF COMPOUNDS PRODUCED FROM PETROLEUM UTILIZATION ON MARINE INVERTEBRATES WITH EMPHASIS ON NEOPLASIA AND CARCINOGENESIS (

START/ COMPL DATE : 07/76 - 05/78 : FUNDING : EST. - FY 77 / $ 20000
TASK/EPA CODE :IQ625A-1-06 / R804427-02 (GRANT) PRIOR FY76 / $ 604401
PROJECT OFFICER : J A COUCH
INVESTIGATORS : M C MIX OREGON STATE HIGHER EDUC. SYS
MILE: 05/78 -FINAL REPORT

OBJECTIVES: 1) TO DETERMINE THE CONCENTRATION (BODY BURDENS) OF SELECTED ENVIRONMENTAL CHEMICAL CARCINOGENS IN ECONOMICALLY-IMPORTANT MOLLUSKS AND CRUSTACEANS FROM OREGON BAYS, ESTUARIES AND INSHORE AREAS. 2) TO DETERMINE IF THERE IS A POTENTIAL PUBLIC HEALTH HAZARD TO MAN FROM CONSUMING SHELLFISH, HARVESTED FROM OREGON BAYS, ESTUARIES AND INSHORE AREAS, WHICH CONTAIN PETROLEUM BY-PRODUCTS THAT ARE CARCINOGENIC. 3) TO SURVEY POPULATIONS OF BIVALVE MOLLUSKS, DETERMINE THE INCIDENCE OF NEOPLASTIC DISEASES IN THESE POPULATIONS AND ASCERTAIN IF THERE IS ANY CORRELATION BETWEEN CARCINOGENIC BODY BURDENS AND THE INCIDENCES OF SUCH DISEASES. 4) TO IDENTIFY POINT SOURCES OF CHEMICAL CARCINOGENS THAT ARE PRESENT IN OREGON BAYS AND ESTUARIES UTILIZED IN THIS STUDY. 5) TO DETERMINE RATES OF CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBON UPTAKE AND ELIMINATION IN BIVALVE MOLLUSKS. EXTENSIVE PRELIMINARY INVESTIGATIONS HAVE BEEN CONDUCTED TO: DETERMINE WHICH OREGON BAYS WILL BE UTILIZED IN THE STUDY; ASCERTAIN WHICH SHELLFISH SPECIES WILL BE USED; LOCATE SITES AT WHICH SHELLFISH CAN BE CONTINUOUSLY SAMPLED. BIVALVE MOLLUSKS FROM DIFFERENT HABITATS IN THE VARIOUS BAYS ARE ANALYZED FOR THE PRESENCE AND AMOUNT OF BENZO(A)PYRENE (BAP) MONTHLY OR BI-MONTHLY. HISTOLOGICAL SECTIONS ARE PREPARED SO THAT DIAGNOSES CAN BE MADE AND NEOPLASTIC DISEASES, IF PRESENT, CAN BE IDENTIFIED.

II-173

DEVELOP AEROSOL SIZE DISTRIBUTION MONITOR USING ACOUSTICAL LASER DOPPLER EFFECT

START/ COMPL DATE ! 06/76 - 05/79 ! FUNDING ! EST, - FY 77 / $ 48000
TASK/EPA CODE !G7128-BE-39 / R804429-02 (GRANT) PRIOR FY76 / $ 390001
PROJECT OFFICER ! C W LEWIS
INVESTIGATORS ! M K TESTERMAN UNIV, OF ARKANSAS
M K MAZUMDER UNIV, OF ARKANSAS
R W RAIBLE UNIV, OF ARKANSAS
R A SIMS UNIV, OF ARKANSAS
P C MCLEOD UNIV, OF ARKANSAS
MILE! 06/79 -FINAL REPORT

OBJECTIVES! TO DEVELOP AN AMBIENT AEROSOL PARTICLE SIZE SPECTROMETER CAPABLE OF MEASURING IN REAL-TIME THE AERODYNAMIC SIZE DISTRIBUTION IN THE RANGE 0,05 TO 25 MICRONS IN DIAMETER, APPROACH! THE MEASUREMENT METHOD CONSISTS OF (1) CAUSING INDIVIDUAL AEROSOL PARTICLES TO OSCILLATE IN A SINUSOIDALLY VARYING ACOUSTICAL FIELD, AND (2) MEASURING BY MEANS OF A LASER DOPPLER TECHNIQUE THE PHASE LAG OF EACH PARTICLE'S MOTION RELATIVE TO THE ACOUSTICAL EXCITATION, WITH THE PHASE LAG BEING DIRECTLY RELATED TO THE AERODYNAMIC SIZE OF THE PARTICLE, CURRENT PLANS/PROGRESS! AT THE END OF THE FIRST YEAR'S WORK A FIRST PROTOTYPE SPECTROMETER HAS BEEN BUILT WHICH IS ABLE TO MEASURE AERODYNAMIC SIZE DISTRIBUTIONS IN THE 0,3 TO 5 MICRON RANGE, DURING THE SECOND YEAR THE PROTOTYPE'S PERFORMANCE WILL BE EVALUATED, AND BASIC RESEARCH WILL BE PERFORMED TO INVESTIGATE THE MOST FEASIBLE METHOD FOR EXTENDING THE SIZE RANGE, DURING THE THIRD YEAR A SECOND PROTOTYPE WILL BE BUILT WHICH SHOULD MEET THE ORIGINAL OBJECTIVE,

CHLORINATION OF AQUATIC HUMIC SUBSTANCES

START/ COMPL DATE : 07/76 - 07/79 : FUNDING : EST. - FY 77 / $ 112211
TASK/EPA CODE :C614 -7173 / R804430-02 (GRANT) PRIOR FY76 / $ 1190001
PROJECT OFFICER : A A STEVENS

INVESTIGATORS :	R F CHRISTMAN	UNIV. OF NORTH CAROLINA
	J D JOHNSON	UNIV. OF NORTH CAROLINA
	C R OMELIA	UNIV. OF NORTH CAROLINA
	P C SINGER	UNIV. OF NORTH CAROLINA
	F K PFAENDER	UNIV. OF NORTH CAROLINA

MILE: 06/76 -GRANT AWARDED
07/77 -INTERIM REPORT
07/78 -INTERIM REPORT
04/79 -PROJECT COMPLETED
10/79 -FINAL REPORT PUBLISHED

THE OBJECTIVES OF THIS RESEARCH PROJECT ARE TO A) ESTABLISH THE RELATIVE CONTRIBUTION TO TOTAL TRIHALOMETHANE PRODUCTION OF NATURAL AQUEOUS HUMIC MATERIAL IN WATERS FROM DIFFERENT SOURCES, B) CHARACTERIZE THE CHEMICAL NATURE OF THE REACTIONS THAT OCCUR BETWEEN AQUEOUS HUMIC MATERIALS AND CHLORINE, AND C) ASSESS THE WATER TREATMENT IMPLICATIONS OF PRECHLORINATION OF HUMIC-CONTAINING WATERS WITH RESPECT TO THE FORMATION OF TRIHALOMETHANES AND OTHER CHLORINATED ORGANIC SPECIES. THE EXPERIMENTAL APPROACH INCLUDES LABORATORY STUDIES AND GC/MS IDENTIFICATION OF REACTION PRODUCTS WITH DIFFERENT NATURAL HUMIC WATERS AND VARIOUS MODEL HUMIC STRUCTURES. A WIDE RANGE OF MODEL ORGANIC COMPOUNDS REPRESENTATIVE OF NATURAL HUMIC MATERIAL WILL BE CHLORINATED OVER A RANGE OF PH, CHLORINE TO CARBON RATIOS, AND TEMPERATURES REPRESENTATIVE OF CONDITIONS IN WATER TREATMENT PLANT OPERATIONS. TRIHALOMETHANES AND TOTAL ORGANIC CHLORINE CONCENTRATIONS WILL BE MEASURED. HUMIC FRACTIONS EXTRACTED FROM RAW WATER SUPPLIES WILL ALSO BE CHLORINATED, IN THE PRESENCE AND ABSENCE OF SURFACES AND TREATED IN THE SAME MANNER AS THE MODEL COMPOUNDS.

804431

The Santa Clara Valley Water District is constructing a facility for advanced waste treatment and injection of two million gallons per day of municipal wastewater into an aquifer in the Palo Alto Bayfront area to serve as a barrier against seawater intrusion into the groundwater. As a long-term goal, this facility will be used for research to determine the feasibility of such a system for reclaiming water for potable uses.

The major objectives of the research are as follows:

1. To determine the effects the injected wastewater will have on the chemical, physical, and biological quality of the basin and injected waters.

2. To determine the effect injected wastewater will have on the hydrologic and mineralogic characteristics of the aquifer.

3. To seek the optimum quality for injected water which will result in a high-quality basin water and minimum damage to the hydrologic characteristics of the aquifer.

4. To develop generalized mathematical models for describing the movement of water, the changes in hydrologic characteristics, and resulting changes in water quality from wastewater injection in order to make the results of most value for application in other similar projects.

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REMOVAL OF TRACE ORGANICS FROM WATER USING ACTIVATED CARBON AND
POLYMERIC ADSORBENTS
   START/ COMPL DATE :    06/76 - 06/78 : FUNDING : EST, - FY   77  / $   15000
    TASK/EPA CODE :C614A-7159   / R804433-01  (GRANT)  PRIOR  FY76 / $  1130001
   PROJECT OFFICER : D T  LOVE
   INVESTIGATORS :    C    OULMAN                        AMER, WATER WORKS ASSN, RES,
                      M J TARAS                          AMER, WATER WORKS ASSN, RES,
                      J T OCONNER                        AMER, WATER WORKS ASSN, RES,
                      V L SNOEYINK                       AMER, WATER WORKS ASSN, RES,
   MILE: 06/76 -INITIATE PROJECT
         11/76 -SELECT ADSORPTION MEDIA ON BASIS OF BENCH TESTS
         03/77 -BEGIN OPERATION OF PILOT ADSORPTION VESSELS
         04/78 -COMPLETE LABORATORY WORK
         06/78 -FINAL REPORT
     ON THE BASIS OF BENCH SCALE STUDIES AND OTHER AVAILABLE PERFORMANCE DATA,
     POLYMERIC ADSORBENTS WILL BE SELECTED FOR USE IN PILOT SCALE POST F
     ILTRATION ADSORBERS TO DETERMINE THE EFFECTIVENESS OF SYNTHETIC RESINS TO:
     REMOVE TASTE AND ODOR COMPOUNDS; REMOVE TRIHALOMETHANES; PERFORM THOROUGH
      MULTIPLE INPLACE REGENERATION CYCLES, THE ADSORPTION MEDIUM HAS BEEN
     SELECTED AND THE PILOT COLUMNS ARE OPERATIONAL AT THE KANSAS CITY, MO,
     WATER TREATMENT PLANT UNDER THE DIRECTION OF DR, O'CONNER, STEAM IS BEING
     USED TO REGENERATE THE POLYMERIC RESINS IN-PLACE, AN ECONOMIC EVALUATION
     WILL BE MADE ON THE USE OF RESINS AS A UNIT TREATMENT PROCESS BASED ON
     THE PILOT SCALE PERFORMANCE,
DEVELOPMENT OF METHODS FOR THE STABILIZATION OF PYROLYTIC OILS

    START/ COMPL DATE :    06/76 - 06/78 : FUNDING : EST, - FY   77  / $   35000
     TASK/EPA CODE :C618A-7035   / R804440-02  (GRANT)  PRIOR  FY76 / $   630001
    PROJECT OFFICER : C P  ROGERS
    INVESTIGATORS :    T W COLE                            ATLANTA UNIVERSITY
                       M B POLK                            ATLANTA UNIVERSITY
    MILE: 06/77 -GRANT AWARDED
          12/77 -INTERIM REPORT ON THE STABILIZATION OF PYROLYTIC OILS
          09/78 -COMPLETE BASIC STUDIES ON CHEMICAL EXCHANGES
          06/78 -PROJECT COMPLETED
          09/78 -FINAL REPORT
     OUR OBJECTIVES ARE TO OBSERVE ANY CHANGES IN THE CHEMICAL COMPOSITION OF
     THE PYROLYTIC OILS AS A FUNCTION OF INCREASING VISCOSITY. AFTER THE MEC
     HANISM OF THE INCREASE IN VISCOSITY OF THE PYROLYTIC OILS HAS BEEN ELUCIDA
     TED, ATTEMPTS WILL BE MADE TO STABILIZE THE PYROLYTIC OIL AGAINST WHATEVER
      CHANGES IT UNDERGOES. WE HAVE DEVLOPED, JOINTLY, A COMBINED GAS CHR
     OMATOGRAPHIC-MASS SPECTROMETRIC AND LIQUID CHROMATOGRAPHIC ANALYSIS SCHEME
     FOR THE PYROLYTIC OILS. WE HAVE IDENTIFIED ETHANOL, ACETIC ACID,
     ACETONE, ACETALDEHYDE, ISOBUTYL ALCOHOL, O-CRESOL, M-CRESOL, FURFURAL,
      M-DIMETHOXYBENZENE, M-METHOXYPHENOL, AND VERATROLE IN THE OILS
     OBTAINED BY VACUUM DISTILLATION AND COLUMN CHROMATOGRAPHY OF THE PYROLYTIC
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SURVEY OF NUTRIENTS AND HAZARDOUS SUBSTANCES IN SAGINAW BAY, MICHIGAN

   START/ COMPL DATE :    04/76 - 03/79 : FUNDING : EST. - FY   77  / $  168255
    TASK/EPA CODE :N608A-029    / R804442-02  (GRANT)  PRIOR  FY76 / $  1175591
   PROJECT OFFICER : V J  BIERMAN
   INVESTIGATORS :    V E SMITH                       CRANBROOK INSTITUTE OF SCIENC
                      K W LEE                         CRANBROOK INSTITUTE OF SCIENC
   MILE: 03/79 -FINAL REPORT
     THE DISTRIBUTION OF MAJOR NUTRIENTS AND HAZARDOUS SUBSTANCES IN SAGINAW B
     AY WILL BE SURVEYED DUPING 15 CRUISES IN 1976. OBJECTIVES OF THE STUDY ARE
      TO: SUPPORT THE CONTINUING DEVELOPMENT AND VERIFICATION OF NUTRI
     ENT TRANSPORT AND PRODUCTIVITY MODELS; DEFINE THE DISTRIBUTION AND FATE OF
      HAZARDOUS SUBSTANCES IN BAY WATER SEDIMENTS, AND BIOTA. SAMPLING AND
     IN SITU MONITORING WILL BE CONDUCTED AT 15 PRIMARY STATIONS OFFSHORE
     AND 5 SECONDARY STATIONS INSHORE (I.E., MARSH AND ISLAND LITTORAL ZONES).
     SAMPLES OF SECTOR, SURFACE FILMS, SEDIMENTS AND AQUATIC ORGANISMS WILL BE
     ANALYZED FOR METALS (ZINC, COPPER, CADMIUM) AND ORGANIC CONTAMINANTS
     (CHLORINATED HYDROCARBONS, POLYNUCLEAR AROMATIC HYDROCARBONS, PHTHALATE
     ESTERS). THESE AND SUPPLEMENTAL DATA WILL BE USED TO DEVELOP A DESCRIPTION
     OF MASS BALANCE FOR SAGINAW BAY. ALL CRUISES WILL COINCIDE WITH SATELLITE
     (ERTS) COVERAGE OF THE AREA. THIS WORK IS PART OF A CONTINUING EPA
     STUDY OF WATER QUALITY DYNAMICS IN SAGINAW BAY, BEGUN IN 1973.
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804443

II-179

Semi-empirical characteristic time correlations for pollutant emissions developed for simplified aircraft gas turbine combustors will be compared with exhaust emissions data for existing aircraft engines to test their applicability for the latter. The previous work indicates that an optimum geometry for minimum emissions can be defined for given combustor operating conditions and that the optimum simplified turbine combustor cannot meet 1979 Class T2 EPA emissions standards. If the correlations can be extended to more representative aircraft combustors, then it should prove possible to determine if the optimum combustor can satisfy the appropriate EPA aircraft standards; the work should thus prove helpful in exploring the stringency of the standards.

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BIOLOGICALLY MEDIATED CORROSION AND DETERIORATION OF WATER QUALITY IN
WATER DISTRIBUTION SYSTEMS
   START/ COMPL DATE :    04/76 - 03/78 : FUNDING : EST. - FY   77  / $   61140
    TASK/EPA CODE :C614A-7200    / R804444-02  (GRANT)  PRIOR  FY76 / $   678261
   PROJECT OFFICER : R     TAYLOR
   INVESTIGATORS :     J T OCONNOR                     UNIV. OF MISSOURI
                       S K BANERJI                     UNIV. OF MISSOURI
   MILE: 04/76 -PROJECT START
         04/77 -CONTINUATION FUNDING PROCESSED (02 YEAR)
         01/77 -PIPE LOOP STUDIES BEGIN
         01/78 -CONTINUATION FUNDING PROCESSED (03 YEAR)
         04/78 -QUESTIONNAIRE COMPLETION AND DATA COMPILATION
         07/78 -INTERIM REPORT PUBLISHED
         04/79 -COMPLETE SEDIMENT AND WATER ANALYSES
         04/79 -CONTINUATION FUNDING PROCESSED (04 YEAR)
         04/81 -COMPLETE GUIDELINES DOCUMENT
         07/81 -FINAL REPORT PUBLISHED
     THE OBJECTIVES OF THE RESEARCH PROJECT ARE TO: 1. DETERMINE THE EXTENT AND
      NATURE OF WATER QUALITY PROBLEMS ORIGINATING IN WATER DISTRIBUTION
     SYSTEMS IN THE U.S. 2. CONDUCT LABORATORY STUDIES TO ASSESS THE POTENTIAL
     FOR A TREATED WATER TO PROMOTE SEDIMENT DEPOSITION AND MICROBIAL GROWTH IN
      DISTRIBUTION SYSTEMS. 3. DETERMINE THE ROLE OF MICROORGANISMS IN
     MEDIATING CHEMICAL CHANGES OBSERVED IN DISTRIBUTION SYSTEMS. 4.
     DETERMINE REMEDIAL MEASURES FOR CONTROLLING SEDIMENT DEPOSITION, ORGAN
     ISM GROWTH AND QUALITY DETERIORATION. 5. PREPARE A GUIDELINES DOCUMENT FOR
      USE BY WATER UTILITIES FOR ASSESSING AND CONTROLLING WATER QUALITY
     PROBLEMS IN DISTRIBUTION SYSTEMS. A NATION-WIDE MAIL SURVEY, FOLLOWED BY
     SELECTED SITE VISITS, WILL BE MADE TO DETERMINE THE EXTENT AND NATURE OF
     WATER QUALITY PROBLEMS IN DISTRIBUTION SYSTEMS. LABORATORY STUDIES WILL BE
     CONDUCTED USING PIPE LOOPS TO DETERMINE THE WATER QUALITY CHANGES UNDER
      VARIED CONDITIONS OF INPUT WATER QUALITY. ALTERNATE METHODS TO CON
     TROL THE WATER QUALITY DETERIORATION IN LABORATORY PIPE LOOPS WILL ALSO BE
     TESTED.
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MODELING FOR 208 AREA-WIDE WASTE MANAGEMENT PLANNING IN NON-DESIGNATED
AREAS
   START/ COMPL DATE :    05/76 - 05/78 : FUNDING : EST. - FY   77  / $   35000
    TASK/EPA CODE :K609A-407    / R804450      (GRANT)  PRIOR  FY76 / $  1456001
   PROJECT OFFICER : J W  FALCO
   INVESTIGATORS :   C W CHEN                          TETRA TECH INCORPORATED
                     S   ZISON                         TETRA TECH INCORPORATED
                     M   LORENZEN                      TETRA TECH INCORPORATED
                     P   JOHANSON                      TETRA TECH INCORPORATED
                     D   SMITH                         TETRA TECH INCORPORATED
   MILE: 03/76 -START PROJECT
         11/76 -INTERIM MODEL REPORT
         01/77 -INTERIM PARAMETER ESTIMATION REPORT
         10/77 -FINAL REPORT - BASIN-WIDE ASSESSMENT METHODOLOGY
         12/77 -FINAL REPORT - COEFFICIENT ESTIMATION TECHNIQUES
         12/77 -FINAL REPORT - COMPUTERIZED METHODOLOGY
      THE RESEARCH WILL DEVELOP A PLANNING TOOL FOR WATER QUALITY ANALYSIS IN
      NON-DESIGNATED 208 PLANNING REGIONS. THE TOOL WILL INCLUDE A MODEL FOR PRE
      LIMINARY SCREENING TO ISOLATE PROBLEMS AREAS OF POINT AND NON-POINT WASTES
      AND EVALUATE INFORMATION FOR FOLLOW-UP DETAILED MODELING TO ASSESS THE
      IMPACT OF WASTE MANAGEMENT ALTERNATIVES. THE PLANNING MODEL WILL FUNCTION
      WITH A LIMITED DATA BASE, AND WILL PROVIDE HIGH AND LOW ESTIMATES FOR SIM
      ULATION RESULTS. THE OUTPUT WILL BE DESIGNED FOR EASE OF INTERPRETATION BY
       THE PLANNER. THE NON-POINT SOURCE DATA BASE AND THE LOADING FUNCTIONS
      DEVELOPED BY MIDWEST RESEARCH INSTITUTE (R804743-01) WILL BE USED TO ES
      TIMATE POLLUTANT FLUX FROM WATERSHEDS. RIVERS, ESTUARIES, AND IMPOUNDMENTS
      WILL BE ACCOMMODATED AS WELL AS STORM WATER RUNOFF. SEVERAL APPROACHES TO
       WATER QUALITY MODELING AND ANALYSIS ARE INCLUDED TO OFFSET THE POTENTIAL
      BIAS OF ANY SINGLE METHOD. THE PROJECT WILL BE USEFUL TO PROVIDE PRESCRE
      ENING FOR A LARGE AREA AND TO FOCUS ON REGIONS NOT CONFORMING TO THE GOALS
       OF PUBLIC LAW 92-500, ESPECIALLY BECAUSE IT WILL BE EASILY APPLIED
      WITH A LIMITED DATA BASE. SUBSTANTIAL SAVING IN PLANNING COST IS EXPECTED
      WITHOUT SACRIFICING ACCURACY IN ISOLATING PROBLEM AREAS.
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ORIGIN, VIRULENCE, GROWTH, AND CONTROL OF COLIFORMS IN DRINKING WATER
EMANATING FROM WOODEN TANKS
   START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST. - FY   77  / $   26038
    TASK/EPA CODE :C614A-7192    / R804456-02  (GRANT)  PRIOR  FY76 / $   244941
   PROJECT OFFICER : H D  NASH
   INVESTIGATORS :   R J SEIDLER                        OREGON STATE HIGHER EDUC. SYS
   MILE: 05/76 -PACKAGE PROCESSED
         06/76 -PROJECT START
         05/77 -CONTINUATION PKG PROCESSED
         08/77 -INTERIM REPORT
         05/78 -PROJECT COMPLETED
         08/78 -FINAL REPORT PUBLISHED
     THE OBJECTIVES ARE TO FORMULATE SPECIFIC RECOMMENDATIONS ON THE S
     IGNIFICANCE AND CONTROL OF KLEBSIELLA PNEUMONIAE AND OTHER COLIFORMS WHICH
      ARE PRESENT IN DRINKING WATER EMANATING FROM REDWOOD TANKS. THE P
     RIMARY OBJECTIVES WILL BE ACHIEVED BY THE FOLLOWING APPROACHES: 1. DETERMI
     NING THE VIRULENCE AND ANTIBIOTIC RESISTANCE OF COLIFORMS PRESENT IN THESE
      DRINKING WATER SYSTEMS. 2. STUDIES ON AN EXPERIMENTAL 1,000 GALLON
     TANK TO DETERMINE THE NECESSARY ENGINEERING, PLUMBING, AND CHLORINATION
     REQUIREMENTS TO KEEP REDWOOD TANKS FREE OF COLIFORMS AND OTHER UNDESIRABLE
     MICROBES. 3. DETERMINING THE NUTRITIONAL BASES FOR THE GROWTH AND SURVIVAL
     OF COLIFORMS IN REDWOOD TANKS.
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PRESSURE FILTRATION-PYROLYSIS OF SEWAGE SLUDGE IN MULTIPLE HEARTH
FURNACE
   START/ COMPL DATE :    06/76 - 08/78 : FUNDING : EST. - FY   77  / $   79000
    TASK/EPA CODE :C611B-7076   / R804463-01  (GRANT)  PRIOR  FY76 / $  1687251
   PROJECT OFFICER : H O  WALL
   INVESTIGATORS :     A I MYTELKA                     INTERSTATE SANITATION COMM.
                       T R GLENN                       INTERSTATE SANITATION COMM.
                       K   PIONTEK                     INTERSTATE SANITATION COMM.
                       C   VONDREUSCHE                 INTERSTATE SANITATION COMM.
   MILE: 12/77 -REPORT ON WORKABLE DESIGN TO CONVERT MULTIPLE HEARTH FURNACE FR
         09/78 -REPORT ON MATERIAL BALANCE AROUND INCINERATION AND PYROLYSIS UN
    THE PRIMARY OBJECTIVE OF THIS PROJECT IS TO DEVELOP A WORKABLE DESIGN FOR
    CONVERSION OF A PLANT SCALE MULTIPLE HEARTH SLUDGE INCINERATION SYSTE
    M TO PYROLYTIC OR LIMITED AIR MODE OF OPERATION. THE SLUDGE WILL BE DEWATE
    RED ON A FILTER PRESS AND PYROLYZED IN A PILOT PLANT 36 INCH I.D. MULTIPLE
     HEARTH UNIT. FUEL EFFICIENCY, EMISSIONS POTENTIAL AND COST WILL BE
    EVALUATED. THE PROJECT HAS BEEN EXTENDED TO INCLUDE AN OBJECTIVE OF MAKING
    A MATERIAL BALANCE FOR INCINERATION OF SLUDGE IN THE MULTIPLE HEARTH
    FURNACE WHEN IT INCINERATES SLUDGE BY THE STANDARD OPERATION AND BY THE
    PYROLYTIC SYSTEM OR STARVED AIR MODE OF OPERATION. SPECIAL ATTENTION WILL
    BE GIVEN TO THE PARTICULATE EMISSIONS TO THE ATMOSPHERE WHICH CAN
    AFFECT THE RESPIRATORY SYSTEM FOR BOTH METHODS OF OPERATION. PARTICULATES
    OF THE SIZE RANGE 0-1, 1-3 AND 3-5 AND GREATER THAN 5 MICRONS WILL BE
    DETERMINED.
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AEROSOL MODELING

START/ COMPL DATE !   10/76 = 10/81 ! FUNDING ! EST, = FY   77 / $ 16535
TASK/EPA CODE !G603A=AH=06 / R804470=01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER ! W E WILSON
INVESTIGATORS !   G R BROWN   CLARK COLLEGE
MILE! 06/78 =REPORT ON GAS AEROSOL REACTIVE RATES

OBJECTIVES! COORDINATE PROGRAMS TO DEVELOP SUB=MODELS FOR CHEMICAL AND PHYSICAL PROCESSES OF AEROSOLS IN THE ATMOSPHERE, APPROACH! COMBINE NUMERICAL SUB=MODELS FOR PROCESSES INCLUDING NUCLEATION, CONDENSATION, GAS=AEROSOL CHEMICAL REACTIONS, COAGULATION, DRY DEPOSITION AND DISPERSION, CURRENT PLANS/PROGRESS! EXTRAMURAL WORK HAS PRODUCED A MODEL THAT INCORPORATES THESE PROCESSES, CALCULATIONS HAVE BEEN PERFORMED FOR THE TRANSPORT OF SULFURIC ACID GENERATED BY CATALYST=EQUIPPED AUTOMOBILES AND THE TRANSPORT OF DUST IN A SOUTHWESTERN CITY, REFINEMENTS TO THE MODEL ARE TO BE MADE AS CHEMICAL RATE DATA FOR GAS=AEROSOL REACTIONS BECOME AVAILABLE,

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DEVELOPMENT OF FIELD VIRUS CONCENTRATION TECHNOLOGY

  START/ COMPL DATE :    11/76 - 04/79 : FUNDING : EST. - FY   77  / $   43000
   TASK/EPA CODE :A713C-31      / R804474-01  (GRANT)  PRIOR  FY   /         1
  PROJECT OFFICER : G    BERG
  INVESTIGATORS :    C A SORBER                      UNIV. OF TEXAS
                     B P SAGIK                       UNIV. OF TEXAS
                     B E MOORE                       UNIV. OF TEXAS
 MILE: 04/78 -INTERIM REPORT
       04/79 -FINAL REPORT
   OBJECTIVES: THE OVERALL OBJECTIVE OF THIS STUDY IS TO OPTIMIZE A FLOW
   -THROUGH, CLAY-FILTER MEDIA SYSTEM FOR RECOVERING SMALL NUMBERS OF VIRUSES
   FROM LARGE VOLUMES OF WATER. A HIGH RATE SYSTEM, CAPABLE OF CONCENTRA
   TING AND RECOVERY OF PARTICULATE-ASSOCIATED AS WELL AS "FREE" VIRUSES FROM
   AT LEAST 100 GALLON VOLUMES OF A VARIETY OF WATERS, IS SOUGHT. APPROACH:
    CURRENT EFFORTS WILL CONCENTRATE ON THREE ASPECTS OF THE STUDY:
   A. CONTINUED EVALUATION OF CANDIDATE FILTER SYSTEMS CAPABLE OF PR
   OVIDING A SUSTAINED HIGH FLOW RATE IN CONJUNCTION WITH THE USE OF THE BENT
   ONITE VIRUS CONCENTRATION PROCEDURE. B. EACH CANDIDATE FILTER MEDIA SYSTEM
   WILL BE EVALUATED IN TERMS OF THE OPTIMAL VIRUS ELUTION SYSTEM REQUIRED.
   FACTORS TO BE CONSIDERED ARE SYSTEM HYDRAULICS, SYSTEM MATERIALS (
   COMPOSITION AND AMOUNT) AND VOLUME AND TYPE OF ELUANT. C. SUCCESSFUL BENCH
   SCALE FILTER-ELUTION SYSTEMS WILL BE UPGRADED IN PROTOTYPE SO THAT
   MINIMUM TEST VOLUMES OF 100 GALLONS CAN BE PROCESSED. FIELD TESTING IN
   A VARIETY OF WATERS WILL BE INITIATED. THE COMPARATIVE EVAL
   UATION OF THE DEVELOPED METHODOLOGY WITH COMMERICAL FLOW-THROUGH VIRUS CON
   CENTRATION SYSTEMS WHICH CAN HANDLE COMPARABLE VOLUMES OF DIFFERENT WATERS
   WILL BE CONDUCTED. PROGRESS: THE USE OF THE BENTONITE CONCENTRATION
   PROCEDURE CONTINUES TO BE THE PROCEDURE OF CHOICE FOR CONCENTRATING
   PARTICULATE-ASSOCIATED AS WELL AS "FREE" VIRUSES FROM NATURAL WATERS. A
   FLOW-THROUGH PROCEDURE USING DIATOMACEOUS EARTH AS A FILTER AID HAS BEEN
   SHOWN TO BE EFFECTIVE. HOWEVER, HARDWARE LIMITATIONS HAVE RESULTED
   IN LIMITED SUCCESS IN DEALING WITH LARGE VOLUMES. MODIFICATIONS TO THE
   FILTRATION SYSTEM IS PLANNED ALONG WITH THE EVALUATION OF ALTERNATE
   PROCESSES.
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II-186

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EFFECTS OF POLLUTANTS ON MICROBIAL ACTIVITIES IN ESTUARINE SURFACE FILMS

      START/ COMPL DATE :    05/76 - 05/79 : FUNDING : EST. - FY   77  / $   40000
       TASK/EPA CODE :Q714A-1-1    / R804477-02  (GRANT)  PRIOR  FY76 / $   500001
      PROJECT OFFICER : A W  BOURQUIN
      INVESTIGATORS :    D G AHEARN                       GEORGIA STATE UNIVERSITY
                         W L COOK                         GEORGIA STATE UNIVERSITY
                         A   ABDELAL                      GEORGIA STATE UNIVERSITY
                         S A CROW                         GEORGIA STATE UNIVERSITY
      MILE: 05/79 -FINAL REPORT
        STUDIES OF THE RATES OF BIOACCUMULATION AND/OR DEGRADATION OF SELECT HY
        DROCARBONS, PESTICIDES AND CHLORINATED AROMATICS BY REPRESENTATIVE SURFACE
         SLICK MICROORGANISMS ARE IN PROGRESS, MINIMAL MUTAGENIC AND INH
        IBITORY CONCENTRATIONS OF THESE COMPOUNDS ARE BEING DETERMINED FOR VARIOUS
         PHYSIOLOGICAL GROUPS, ATTEMPTS ARE UNDERWAY TO DEVELOP ASSAY OR
        GANISMS FOR THE BIODETECTION OF POTENTIALLY HARMFUL CHEMICALS IN ESTUARINE
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POTENTIAL BENEFICIAL USE OF INDUSTRIAL WASTE HEAT FOR GREENHOUSE PRODUCTION OF BEDDING PLANTS, CUT FLOWERS AND FOLIAGE PLANTS

START/ COMPL DATE : 08/77 - 08/78 : FUNDING : EST. - FY 77 / $ 60000
TASK/EPA CODE :F624A-039 / R804499 (GRANT) PRIOR FY76 / $ 400001
PROJECT OFFICER : T G BRNA
INVESTIGATORS : I J CRUMBLY FORT VALLEY STATE COLLEGE
D W ROBINSON FORT VALLEY STATE COLLEGE
B ADAMS FORT VALLEY STATE COLLEGE
J KENNEBREW FORT VALLEY STATE COLLEGE
MILE: 08/77 -LABORATORY STUDIES COMPLETED
09/77 -GREENHOUSES CONSTRUCTED
08/77 -FINAL REPORT COMPLETED

OBJECTIVES: THE FEASIBILITY OF USING INDUSTRIAL WASTE HEAT TO CONTROL THE ENVIRONMENT OF GREENHOUSES WILL BE EVALUATED RELATIVE TO THREE MAJOR OVERALL OBJECTIVES: A. TESTING THE CAPABILITIES OF THE ENVIRONMENTAL CONTROL SYSTEM; B. DETERMINING THE EFFECTS OF THE GREENHOUSE ENVIRONMENTS ON THE PRODUCTION OF ORNAMENTAL AND VEGETABLE BEDDING PLANTS, CUT-FLOWERS, AND FOLIAGE PLANTS, AND C. EVALUATING THE OVERALL ECONOMICS OF THE SYSTEM. APPROACH: TWO PLASTIC GREENHOUSES, 27' X 72' QUONSET-TYPE, WILL BE USED; ONE WILL SERVE AS THE CONTROL AND THE OTHER AS THE WASTE HEAT RESEARCH GREENHOUSE. CONVENTIONAL ENVIRONMENTAL CONTROL WILL BE USED IN THE CONTROL GREENHOUSE WHILE BOTH HEATING AND COOLING OF THE RESEARCH GREENHOUSE WILL EMPLOY AIR DRAWN THROUGH A CEL-DEK PAD. HEATING WILL BE EFFECTED BY PASSING AIR THROUGH THE CEL-DEK PAD CONTAINING COOLING WATER HEATED BY A BOILER PRIOR TO DISTRIBUTING THE AIR IN THE RESEARCH GREENHOUSE. COOLING WILL BE EFFECTED BY REVERSING THE AIR FLOW DIRECTION. ORNAMENTAL AND CUT-FLOWER, FOLIAGE PLANT, AND VEGETABLE SPECIES, WHICH WERE SELECTED IN EARLIER STUDIES WILL BE GROWN IN THE YEAR-LONG GREENHOUSE PRODUCTION PHASE OF THE STUDY. ECONOMIC STUDIES WILL BE MADE FOR EACH CROP TO ASSESS CUSTOMER ACCEPTANCE AND PRODUCTION COSTS. OUTPUTS: THE FINAL REPORT FOR THE PROJECT WILL PROVIDE DATA, METHODS, AND RESULTS RELATIVE TO THE HORTICULTURAL, ENGINEERING AND ECONOMIC OBJECTIVES OF THE STUDY.

NUTRIENT AND PLANKTON RELATIONSHIPS IN NORTHERN LAKE MICHIGAN

START/ COMPL DATE : 04/76 - 04/78 : FUNDING : EST. - FY 77 / $ 153000
TASK/EPA CODE :N608A-017 / R804503-01 (GRANT) PRIOR FY76 / $ 4355211
PROJECT OFFICER : M D MULLIN

INVESTIGATORS :	C L SCHELSKE	UNIV. OF MICHIGAN
	E F STOERMER	UNIV. OF MICHIGAN
	J E GANNON	UNIV. OF MICHIGAN
	R A MOLL	UNIV. OF MICHIGAN
	M S SIMMONS	UNIV. OF MICHIGAN

MILE: 07/78 -FINAL REPORT DUE

THE PURPOSE OF THIS INVESTIGATION IS THE CHARACTERIZATION OF NORTHERN LAKE MICHIGAN IN TERMS OF PHYSICAL, CHEMICAL AND BIOLOGICAL ENVIRONMENTS AND TO PROVIDE DATA FOR COMPARISON WITH FUTURE STUDIES OF THE DEGREE AND RATE OF ENVIRONMENTAL CHANGE. SOME OF THE OBJECTIVES ARE: 1. TO DETERMINE THE VERTICAL, HORIZONTAL AND SEASONAL VARIATIONS IN SELECTED NUTRIENTS AND OTHER CHEMICAL AND PHYSICAL PARAMETERS. 2. TO DETERMINE THE EFFECTS OF ISLANDS AND THEIR ASSOCIATED MORPHOMETRY ON ENVIRO-CONDITIONS AND TO CONTRAST ENVIRONMENTAL CONDITIONS NEAR ISLANDS WITH NEARSHORE AREAS OF THE MAINLAND. 3. TO ANALYZE PHYTOPLANKTON, ROTIFER, AND CRUSTACEAN ZOOPLANKTON SPECIES COMPOSITION AND ABUNDANCE IN NORTHERN LAKE MICHIGAN. 4. TO UTILIZE DATA ON PHYTOPLANKTON AND ZOOPLANKTON COMMUNITY STRUCTURE AS AN INDICATOR OF THE TROPHIC STATUS OF WATERS IN NORTHERN LAKE MICHIGAN. 5. TO PROVIDE PHYTOPLANKTON AND ZOOPLANKTON DATA THAT WILL BE USEFUL IN CONJUNCTION WITH OTHER PARTS OF THE STUDY TO ASSESS BIOLOGICAL RESPONSES TO NUTRIENT CONDITIONS IN NORTHERN LAKE MICHIGAN WATERS.

(1) The objectives of this project are to demonstrate a new protein precipitation and by-product recovery process which will establish the feasibility of the meat industry meeting the ammonia limits in National effluent guidelines and to demonstrate the advantages of the process prior to discharging to a municipal treatment system.

(2) The approach is to operate and closely monitor a full-scale treatment plant which will be constructed and owned by Sterling Colorado Beef Company. The operation is to optimize removal of nitrogen and other pollutants and document their use and marketability in by-products.

(3) The Company has selected and ordered several major pieces of equipment made in Europe. Minor pieces of equipment and the solid handling equipment remain to be selected. Installation of the equipment and shakedown operations are to be completed prior to beginning the monitoring.

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PROBABILITY BASED MATCHING (PBM) AND SELF TRAINING INTERPRETIVE AND
RETRIEVAL SYSTEM (STIRS)
   START/ COMPL DATE :     07/76 - 01/79 : FUNDING : EST. - FY   77  / $   59112
    TASK/EPA CODE :K614D-125    / R804509     (GRANT)  PRIOR  FY76 / $   580001
   PROJECT OFFICER : W M  SHACKELFORD
   INVESTIGATORS :    F W MCLAFFERTY                CORNELL UNIVERSITY
                      R   VENKATARAGHAV             CORNELL UNIVERSITY
   MILE: 07/76 -AWARD GRANT
         12/77 -ANNUAL REPORT
         01/79 -FINAL REPORT
     THE PBM SYSTEM FOR MASS SPECTRAL IDENTIFICATION WAS DEVELOPED AT CORNELL
     UNIVERSITY. AN IMPROVED VERSION OF THE PROGRAM WAS DEVELOPED AT CORNELL
      UNDER AN EPA RESEARCH GRANT. THE PRESENT TASK WILL INVOLVE DEVELOPING
     MINI-COMPUTER PROGRAMS THAT WILL PERMIT EPA MASS SPECTROMETRY LABORATORIES
     TO UTILIZE PBM ON THEIR OWN DATA SYSTEMS. THE PROGRAMS DEVELOPED WILL BE
      EVALUATED FOR THEIR ABILITY TO IDENTIFY IMPURE ORGANIC MATERIALS FOUND
     AS WATER POLLUTANTS. A MAJOR LIMITATION OF THE STIRS IN POLLUTANT IDENTI
     FICATION IS THE NECESSITY OF THE USERS KNOWING THE MOLECULAR WEIGHT OF THE
     UNKNOWN. STIRS WILL BE MODIFIED TO CORRECT THIS REQUIREMENT.
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DEMONSTRATE & EVALUATE RECLAMATION, STABILIZATION & EROSION CONTROL OF
STRIP MINED LAND FOR AGRICULTURAL USE USING MUNICIPAL SEWAGE
   START/ COMPL DATE :    07/76 - 11/79 : FUNDING : EST. - FY   77  / $  100000
    TASK/EPA CODE :C611B-7060   / S804511-02  (GRANT)  PRIOR  FY76 / $  1000001
   PROJECT OFFICER : G K  DOTSON
   INVESTIGATORS :   W    SOPPER                      STATE DEPT. OF ENV. RESOURCES
                     W    SOPPER                      PENN. STATE UNIVERSITY
                     W C BUCCIARELLI                  STATE DIV. OF SOLID WASTE MGT
                     J P SNYDER                       STATE DIV. OF SOLID WASTE MGT
                     L T KARDOS                       PENN. STATE UNIVERSITY
   MILE: 07/76 -PROJECT START
         11/79 -FINAL REPORT PUBLISHED
    OBJECTIVES: 1) TO DETERMINE THE FEASIBILITY OF USING MUNICIPAL SEWAGE
    SLUDGE TO RECLAIM AND VEGETATE LAND DISTURBED BY MINING ACTIVITIES; 2) TO
    EVALUATE METHODS FOR THE PROCESSING, TRANSPORTATION, SPREADING AND INCO
    RPORATION OF THE SLUDGE INTO THE LAND; 3) TO DEMONSTRATE APPLICATION RATES
    THAT WILL MAXIMIZE BENEFITS TO SOILS, IMPROVE WATER QUALITY, AND MAKE L
    ANDS AGRICULTURALLY PRODUCTIVE; 4) TO EVALUATE THE EFFECT OF VARIED SLUDGE
    APPLICATIONS ON VEGETATION ESTABLISHMENT AND GROWTH (GRASS, LEGUME
    AND TREE SPECIES), INCLUDING FOLIAR ANALYSIS TO DETERMINE NUTRIENT UPTAKE
    AND POTENTIAL HEAVY METAL TOXICITY; 5) TO EVALUATE THE EFFECT OF THE
    SLUDGE APPLICATIONS ON THE CHEMICAL QUALITY OF PERCOLATING
    RECHARGE WATER; 6) TO DETERMINE THE DEGREE OF SITE AMELIORATION RESULTING
    FROM THE SLUDGE APPLICATION BY MONITORING PHYSICAL AND CHEMICAL CHANGES OF
    THE SURFACE SPOIL OR REFUUE MATERIAL; 7) TO EVALUATE THE EFFECT OF THE
    SLUDGE APPLICATION ON THE QUALITY OF THE GROUNDWATER AND/OR THE QUALITY OF
    THE NEAREST RECEIVING STREAM AND/OR SURFACE WATER RUNOFF BY A MO
    NITORING PROGRAM. PROJECT DESCRIPTION: THE PROPOSED PROJECT CONTAINS THREE
    PHASES. PHASE I IS CONCERNED WITH THE PROCESSING OF SEWAGE SLUDGE AT THE
    SEWAGE TREATMENT PLANT AND ITS TRANSPORT TO AND DELIVERY AT THE STRIP MINE
    SITES. PHASE II CONCERNS THE APPLICATION OF THE SLUDGE TO THE LAND AND
    THE REVEGETATION MEASURES NECESSARY TO RETURN THE LAND TO PRODUCTIVE USE.
    PHASE III IS PROJECT EVALUATION.
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DEVELOPMENT OF CHRONOEPIDEMIOLOGIC METHODS WITH REFERENCE TO CARDIOPULMONARY CONDITIONS

START/ COMPL DATE : 06/76 - 06/79 : FUNDING : EST. - FY 77 / $ 53000
TASK/EPA CODE :H601C-7280 / R804512 (GRANT) PRIOR FY76 / $ 600001
PROJECT OFFICER : R J HORTON
INVESTIGATORS : F HALBERG UNIV. OF MINNESOTA
A REINBERG UNIV. OF MINNESOTA
E HALBERG UNIV. OF MINNESOTA
L TONG UNIV. OF MINNESOTA
G CORNELISSEN UNIV. OF MINNESOTA
J LEE UNIV. OF MINNESOTA
MILE: 06/76 -GRANT AWARDED
06/77 -PROGRESS REPORT AND GRANT CONTINUATION
06/78 -PROGRESS REPORT AND GRANT CONTINUATION APPLICATION
06/79 -FINAL REPORT

OBJECTIVES: EXISTING DATA FROM SELECTED STUDIES OF CARDIOPULMONARY CONDITIONS (E.G., PANEL STUDIES OF AIR POLLUTION EFFECTS) WILL BE ANALYZED BY METHODS ACKNOWLEDGING THE EXISTENCE OF BIOLOGICAL AS WELL AS ENVIRONMENTAL PERIODICITIES. RECOMMENDATIONS WILL BE DEVELOPED FOR THE DESIGN AND ANALYSIS OF FUTURE EPIDEMIOLOGIC STUDIES SO THAT PREDICTABLE BIOLOGIC VARIABILITY (RHYTHMS AND TRENDS) CAN BE SEPARATED FROM EFFECTS OF ENVIRONMENTAL FACTORS. APPROACH AND PLANS: STATISTICAL METHODS (INCLUDING THE LEAST-SQUARES FITTING OF COSINE MODELS) WILL BE USED TO QUANTITATIVELY DEFINE CHARACTERISTICS OF RESOLVABLE RHYTHMS, PREFERABLY CIRCADIAN, ABOUT-WEEKLY (CIRCASEPTAN), CIRCANNUAL RHYTHMS AS WELL AS RHYTHMS WITH OTHER PERIODS IN CIRCULATORY AND RESPIRATORY FUNCTION OF HEALTHY SUBJECTS LIVING IN RELATIVELY POLLUTION-FREE ENVIRONMENTS. EXTENSIVE TIME SERIES (E.G., MEASUREMENTS OF HEART RATE, BLOOD PRESSURE AND PEAK EXPIRATORY FLOW 5 OR MORE TIMES DAILY FOR SEVERAL YEARS) ARE ALREADY AVAILABLE FOR THIS PURPOSE. MORBIDITY DATA (E.G., FROM APPROPRIATE PANEL STUDIES SPONSORED BY THE ENVIRONMENTAL PROTECTION AGENCY) WILL BE ANALYZED AGAINST THIS BACKGROUND, USING RHYTHMOMETRIC AND OTHER STATISTICAL PROCEDURES (E.G., CROSS SPECTRAL ANALYSIS). ON THE BASIS OF THIS EXPERIENCE, A FLOW CHART WILL BE DEVELOPED INTEGRATING OLD AND NEW COMPUTER PROGRAMS AND PROVIDING INDICATIONS FOR THE DESIGN AND ANALYSIS OF EPIDEMIOLOGIC TIME SERIES IN GENERAL. PRIMARY EMPHASIS WILL BE PLACED ON CHRONOEPIDEMIOLOGIC STUDIES PERMITTING THE INFERENTIAL STATISTICAL ISOLATION OF RHYTHMS. SUCH CHRONOEPIDEMIOLOGIC CRITERIA SHOULD BE PARTICULARLY PERTINENT AND SENSITIVE FOR AIR POLLUTION MONITORING WITH A VIEW OF HEALTH AND DISEASE.

AIR RESPONSE OF PLANTS TO AIR POLLUTANTS

START/ COMPL DATE : 06/76 - 05/78 : FUNDING : EST. - FY 77 / $ 76475
TASK/EPA CODE :M602A-007 / R804513-02 (GRANT) PRIOR FY76 / $ 900001
PROJECT OFFICER : L C RANIERE
INVESTIGATORS : L H WEINSTEIN BOYCE THOMPSON INST. PLANT RE
MILE: 05/78 -FINAL REPORT

OBJECTIVES: (1) TO DETERMINE WHETHER CONCURRENT EXPOSURE TO MIXTURES OF HYDROGEN FLUORIDE AND OZONE OR HYDROGEN FLUORIDE AND NITROGEN DIOXIDE PRODUCES INTERACTIVE EFFECTS (ANTAGONISM OR SYNERGISM) ON THE GROWTH, YIELD OR ACCUMULATION OF FLUORIDE BY VEGETATION; (2) TO PROVIDE QUANTITATIVE ESTIMATES OF THE EFFECTS OF AMBIENT OXIDANTS ON THE GROWTH, DEVELOPMENT AND YIELD OF ECONOMICALLY-IMPORTANT PLANTS; (3) TO PROVIDE QUANTITATIVE ESTIMATES OF THE EFFECTS OF AMBIENT RAINFALL AND SIMULATED ACIDIC RAIN ON THE GROWTH, DEVELOPMENT AND YIELD OF CROP PLANTS. APPROACHES: FIELD EXPOSURE CHAMBERS, GREENHOUSES AND CONTROLLED ENVIRONMENT CHAMBERS SPECIALLY DESIGNED FOR THESE STUDIES WILL BE USED TO EXPOSE VEGETATION TO CONTROLLED CONCENTRATIONS OF POLLUTANTS. DOSE-RESPONSE RELATIONSHIPS WILL BE DETERMINED TO PROVIDE A BASIS FOR THE DEVELOPMENT OF PREDICTIVE MODELS. PROGRESS: WE HAVE FOUND THAT (1) YIELDS OF BEANS AND TOMATOES ARE REDUCED BY AMBIENT OXIDANTS OCCURRING IN YONKERS, NEW YORK; (2) SULFUR DIOXIDE MAY LOWER OR HAVE NO EFFECT ON THE ACCUMULATION OF FLUORIDE IN PLANTS EXPOSED SIMULTANEOUSLY TO HYDROGEN FLUORIDE AND SULFUR DIOXIDE DEPENDING ON THE PLANT SPECIES AND POLLUTANT CONCENTRATIONS; AND (3) REPEATED EXPOSURE TO SIMULATED ACIDIC RAIN CAUSES NECROTIC LESIONS ON SUSCEPTIBLE HERBACEOUS PLANT SPECIES WHEN PH VALUES ARE LESS THAN 3.4 AND ON NEEDLES OF EASTERN WHITE PINE TREES WHEN PH VALUES ARE LESS THAN 2.6.

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DETERMINATION AND PREDICTION OF CHEMICAL FORMS OF TRACE METALS IN SEWAGE
 SLUDGES AND SLUDGE-AMENDED SOILS
   START/ COMPL DATE :    08/76 - 08/79 : FUNDING : EST. - FY   77  / $   84811
    TASK/EPA CODE :C611B-7070   / R804516-02  (GRANT)  PRIOR  FY76 / $   803111
   PROJECT OFFICER : J A  RYAN
   INVESTIGATORS :    L J LUND                        UNIV. OF CALIFORNIA
                      A L PAGE                        UNIV. OF CALIFORNIA
                      G   SPOSITO                     UNIV. OF CALIFORNIA
   MILE: 09/76 -PROJECT START
         09/77 -INTERMEDIATE FUNDING
         09/78 -INTERMEDIATE FUNDING
         09/78 -INTERIM REPORT
         08/79 -PROJECT COMPLETE
         11/79 -FINAL REPORT
     THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO DEFINE THE CHEMICAL EQUILIBRI
     A BETWEEN TRACE METALS AND THE SOLUBLE AND INSOLUBLE ORGANIC AND INORGANIC
      FRACTIONS OF SEWAGE SLUDGES AND SLUDGE-AMENDED SOILS. THE RESEARCH
     INVOLVES THE DEVELOPMENT AND USE OF TECHNIQUES TO DETERMINE THE CHEMICAL
     FORMS OF TRACE METALS IN SEWAGE SLUDGES AND SEWAGE SLUDGE-AMENDED SOILS,
     THE IDENTIFICATION OF THE TYPES OF METAL-LIGAND COMPLEXES PRESENT, AND THE
     DETERMINATION OF STABILITY CONSTANTS FOR THE INORGANIC AND ORGANIC
     COMPLEXES IDENTIFIED. CADMIUM, ZINC, NICKEL, COPPER AND LEAD ARE THE TRACE
     METALS THAT WILL BE STUDIED IN THIS RESEARCH.
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DENSITY DEPENDENT FACTORS AND THEIR EFFECTS ON GROWTH AND SURVIVAL OF
SPOTTED SEATROUT AND LINED SOLE LARVAE (ABBREV)
   START/ COMPL DATE :    00/00 - 00/00 : FUNDING : EST. - FY   77  / $   18525
    TASK/EPA CODE :P608C-03      / R804519-02  (GRANT)  PRIOR  FY76 / $  165051
   PROJECT OFFICER : A D  BECK
   INVESTIGATORS :   E D HOUDE                        UNIV. OF MIAMI
   MILE: 05/79 -FINAL REPORT ENTITLED, "DENSITY DEPENDENT FACTORS AND THEIR EFF
    LINED SOLES AND SPOTTED SEATROUT ARE BEING REARED IN THE LABORATORY TO
    HELP DEVELOP TECHNIQUES FOR STANDARDIZED CULTURE OF MARINE FISH LARVAE.
    PRESENTLY SUPPORTED RESEARCH IS DESIGNED TO INVESTIGATE EFFECTS OF FOOD
    CONCENTRATION, STOCKING DENSITY AND FOOD TYPES ON SURVIVAL AND GROWTH OF
    LARVAE. OTHER FACTORS BEING INVESTIGATED INCLUDE FEEDING RATES AND GROWTH
    EFFICIENCIES IN RELATION TO SIZE OF LARVAE AND TYPE AND CONCENTRATIONS OF
    FOOD. FOODS THAT ARE BEING USED ARE WILD PLANKTON (COPEPNAUPLII), T
    HE ROTIFER BRACHINOUS PLICATILIS, AND BRINE SHRIMP ARTEMIA SALINA NAUPLII.
     SEATROUT AND LINED SOLES CAN BE REARED FROM EGG TO JUVENILE ON
    EITHER WILD PLANKTON OR ROTIFER-BRINE SHRIMP DIETS. GROWTH
    DURING THE EARLY LARVAL STAGES IS BETTER ON THE WILD PLANKTON THAN ON RO
    TIFERS BUT SURVIVAL IS EQUALLY GOOD ON BOTH FOODS. ADDITIONAL PROPOSED STU
    DIES INCLUDE STUDIES ON LARVAE BEHAVIOR IN RELATION TO FOOD TYPES AND FOOD
     CONCENTRATIONS. ALSO, A COMPARISON OF REARED AND WILD LARVAE OF BOTH
    SPECIES WITH RESPECT TO MORPHOMETRICS AND GROWTH CHARACTERISTICS WILL BE
    INITIATED DURING THE PROPOSED BUDGET PERIOD. THE GOAL OF THE PROJECT IS TO
    PROVIDE STANDARDIZED PROCEDURE THAT WILL INSURE PRODUCTION OF
    LARGE NUMBERS OF MARINE FISH LARVAE, WITH PHYSIOLOGICAL CHARACTERISTICS
    SIMILAR TO WILD LARVAE, THAT COULD BE USED IN POLLUTION AND TOXICANT BIOAS
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II-196

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REMOVING ORGANIC CONTAMINANTS FROM GROUND WATER TO PREVENT FORMATION OF
POTENTIAL CARCINOGENS IN DRINKING WATER
   START/ COMPL DATE :    06/76 - 03/78 : FUNDING : EST. - FY   77  / $  111096
    TASK/EPA CODE :C614A-7150    / R804521-01  (GRANT)  PRIOR  FY76 / $  1475511
   PROJECT OFFICER : J    DEMARCO
   INVESTIGATORS :    D F JACKSON                     DADE CO. DEPT. OF PUB. HEALTH
                      D F JACKSON                     STATE UNIVERSITY OF FLA. SYS.
                      R A MORGAN                      DADE CO. DEPT. OF PUB. HEALTH
                      J F TOOLS                       MIAMI DADE WATER & SEWER AUTH
                      D R BARKER                      STATE UNIVERSITY OF FLA. SYS.
  MILE: 09/77 -INTERIM REPORT
        12/77 -FINAL REPORT
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OBJECTIVES: TO DEVISE FEASIBLE AND ECONOMIC METHODOLOGY FOR REMOVING EXISTING ORGANIC CONTAMINANTS FROM GROUND WATER AND/OR PREVENT DEVELOPMENT OF POTENTIAL CARCINOGENS IN THE PUBLIC WATER SUPPLIES IN DADE COUNTY, FLORIDA. APPROACH: VARIOUS TYPES OF ACTIVATED CARBONS AS WELL AS MACRORETICULATED RESINS WILL BE EVALUATED TO SEE WHICH OF THESE IS THE MOST EFFICIENT AND MOST ECONOMICAL TO USE IN REMOVING ORGANIC CONTAMINANTS FROM DRINKING WATER. CURRENT PROGRESS: THE DRINKING WATER QUALITY LABORATORY, SCHOOL OF TECHNOLOGY, FLORIDA INTERNATIONAL UNIVERSITY, MIAMI, FLORIDA HAS BEEN USING THE TRACOR 222 GAS CHROMATOGRAPH TO STUDY CHLOROFORM CONTENT IN WATERS FROM THE PRESTON WATER TREATMENT PLANT IN DADE COUNTY, FLORIDA. THE RESULTS OF THESE STUDIES ARE IN REPORT NO. 1, "VARIATIONS IN THE CHLOROFORM CONTENT OF WATERS FROM THE JOHN E. PRESTON WATER TREATMENT PLANT, HIALEAH, FLORIDA." REPORT NO. 1 IS FROM THE DRINKING WATER QUALITY LABORATORY AT FLORIDA INTERNATIONAL UNIVERSITY, MIAMI, FLORIDA.

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EFFECTS OF PETROLEUM COMPOUNDS ON ESTUARINE FISHES

   START/ COMPL DATE :    06/76 - 10/78 : FUNDING : EST. - FY   77  / $   25000
    TASK/EPA CODE :Q625F-1-01    / R804527-01  (GRANT)  PRIOR  FY76 / $   856691
   PROJECT OFFICER : J A  COUCH
   INVESTIGATORS :    B J MARTIN                           UNIV. OF SOUTHERN MISSISSIPPI
                      H D HOWSE                            UNIV. OF SOUTHERN MISSISSIPPI
   MILE: 10/78 -FINAL REPORT
     THE PURPOSE OF THIS PROJECT IS TO STUDY CHEMICALLY INDUCED TUMORS IN
     TELEOST FISHES. BOTH MARINE AND FRESHWATER SPECIES WILL BE EXPOSED TO LOW
     LEVELS OF A KNOWN CARCINOGEN FOR 300 DAYS. FISH DEVELOPING TUMORS OR
     OTHER PATHOLOGIES DURING THIS PERIOD WILL BE SACRIFICED AND TISSUE FROM
     THE LIVER, KIDNEY, INTESTINE, AND GILLS WILL BE STUDIED HISTOLOGICALLY.
     TISSUES FROM ALL THE FISH WITH NO GROSSLY APPARENT PATHOLOGIES AT THE SAME
      TIME THE EXPERIMENT IS TERMINATED WILL BE STUDIED IN THE SAME MANNER
     IN ORDER TO DETECT ANY NEOPLASIAS OR PRENEOPLASTIC CONDITIONS. IT IS EXPEC
     TED THAT THIS RESEARCH WILL: 1) PROVIDE EVIDENCE CONCERNING THE QUANTITIES
      OF BENZOPYRENE NECESSARY TO INDUCE NEOPLASIAS, 2) SUPPLY ADDITIONAL
      DATA CONCERNING TUMORS IN TELEOSTS, 3) ESTABLISH THE FEASIBILITY O
     F USING TELEOST FISH AS EARLY INDICATORS OF CARCINOGENIC SUBSTANCES IN THE
      AQUATIC ENVIRONMENT, AND 4) DEMONSTRATE THAT THIS TYPE SYSTEM COULD
     BE USED TO SCREEN COMPOUNDS FOR CARCINOGENIC PROPERTIES WITH LESS
     DIFFICULTY AND EXPENSE THAN THE METHODS CURRENTLY EMPLOYED.
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URINARY STONE DISEASE AND WATER HARDNESS

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START/ COMPL DATE :    12/76 - 11/78 : FUNDING : EST. - FY   77  / $  446324
 TASK/EPA CODE :D614B-071    / R804530-02  (GRANT)  PRIOR  FY77 / $  4949131
PROJECT OFFICER : D G  GREATHOUSE
INVESTIGATORS :    B   FINLAYSON                     STATE UNIVERSITY OF FLA. SYS.
                 R L SCHAEFFER                       STATE UNIVERSITY OF FLA. SYS.
MILE: 03/79 -PROJECT COMPLETED
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THIS IS A STUDY TO DETERMINE THE RELATIONSHIP BETWEEN THE QUALITY OF DRINKING WATER AND UROLITHIASIS (A MAJOR NATIONAL HEALTH PROBLEM). PREVIOUS STUDIES SUGGEST THERE IS A RELATIONSHIP BETWEEN THE QUALITY OF DRINKING WATER AND UROLITHIASIS; HOWEVER, THE VALIDITY OF THE CONCLUSIONS OF THESE STUDIES REMAINS UNCERTAIN BECAUSE OF UNCERTAINTY ABOUT THE WATER ACTUALLY CONSUMED BY STONE FORMERS. IN THIS STUDY WE INTEND TO SAMPLE THE HOUSE WATER ACTUALLY USED BY PATIENT AND CONTROL SUBJECTS. THE FIRST PHASE OF THIS STUDY IS NOW BEING UNDERTAKEN. THIS INCLUDES A PILOT STUDY INVOLVING STONE CASES AND CONTROLS FROM THREE HOSPITALS IN CENTRAL FLORIDA. INTERVIEWS ARE NOW BEING CONDUCTED USING A QUESTIONNAIRE AND INTERVIEWER PROTOCOL DEVELOPED BY THE RESEARCH TEAM. PROGRESS IS BEING MADE ON SETTING UP CODING AND DATA ANALYSIS TECHNIQUES.

DEWATERING PRINCIPLES AND EQUIPMENT DESIGN STUDIES

START/ COMPL DATE : 06/76 - 08/78 : FUNDING : EST. - FY 77 / $ 75000
TASK/EPA CODE :F624A-047 / R804531 (GRANT) PRIOR FY76 / $ 750001
PROJECT OFFICER : J W JONES
INVESTIGATORS : A R TARRER AUBURN UNIVERSITY
B H SHAH AUBURN UNIVERSITY
J C WARMAN AUBURN UNIVERSITY
MILE: 08/78 -ISSUE FINAL REPORT

OBJECTIVES: DEVELOP MORE ECONOMICALLY FEASIBLE METHODS THAN THOSE CURRENTLY AVAILABLE FOR CONTINUOUS TREATMENT OF FLUE GAS CLEANING (FGC) WASTES. INITIAL EFFORTS ARE TO BE CONCENTRATED ON APPLYING GRAVITY SEDIMENTATION TO RAPIDLY, INEXPENSIVELY DEWATER FGC WASTES. APPROACH: DEVELOP METHODS FOR CHARACTERIZING THE PHYSICAL PROPERTIES AND BEHAVIOR OF FGC WASTES. DEVELOP PROCEDURES BASED ON THE MODELS PRESENTED HEREIN TO ALLOW ACCURATE DESIGN AND ANALYSIS OF GRAVITY SEDIMENTATION UNITS USED IN TREATING FGC WASTES. PERFORM BENCH SCALE AND PILOT TESTS TO EVALUATE THE FEASIBILITY OF USING GRAVITY SEDIMENTATION UNITS FOR TREATING FGC WASTES. PERFORM DEVELOPMENTAL STUDIES TO DETERMINE THE BEST DESIGN FOR CHANNEL PROMOTERS. BENCH SCALE AND CONTINUOUS PILOT TESTS ARE TO BE PERFORMED TO EVALUATE THE FEASIBILITY OF SUCH DEVICES FOR IMPROVING DEWATERING EFFICIENCY WHILE TREATING FGC WASTES. ASSESS FILTERABILITY OF DIFFERENT TYPES OF FGC SLUDGES DEWATERED TO DIFFERENT DEGREES AND PUMPING REQUIREMENTS FOR THE DIFFERENT SLUDGES. PROGRESS: A GRAVITY SEDIMENTATION SYSTEM CAN NOW BE PROPOSED WHICH SHOULD ALLOW RAPID DEWATERING OF FGC WASTE TO HIGH CONCENTRATIONS (35 TO 50 PERCENT SOLIDS) WITHOUT THE NEED FOR CHEMICAL ADDITIVES (FLOCCULANTS). THIS SYSTEM SEPARATES THE CLARIFICATION AND THICKENING FUNCTIONS INTO TWO UNITS WHICH ARE MUCH SMALLER AND LESS EXPENSIVE THAN CONVENTIONAL DEWATERING EQUIPMENT. FURTHER DEVELOPMENT OF THIS CONCEPT IS UNDERWAY.

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DEVELOPMENT OF SAFE METHODS FOR DISPOSAL OF EXCESS PESTICIDES USED BY
FARMERS AND AGRICULTURAL APPLICATORS
   START/ COMPL DATE :    10/76 - 10/79 : FUNDING : EST. - FY   77  / $  162179
    TASK/EPA CODE :C618A-7205   / R804533-02  (GRANT)  PRIOR  FY76 / $  1780001
   PROJECT OFFICER : C    ROGERS
   INVESTIGATORS :    G A JUNK                      IOWA STATE UNIV. OF SC. & TEC
                      R A JOHN                      IOWA STATE UNIV. OF SC. & TEC
                      J L BAKER                     IOWA STATE UNIV. OF SC. & TEC
                      J   PESEK                     IOWA STATE UNIV. OF SC. & TEC
                      R P NICHOLSON                 IOWA STATE UNIV. OF SC. & TEC
                      P A HARTMAN                   IOWA STATE UNIV. OF SC. & TEC
                      F   WILLIAMS                  IOWA STATE UNIV. OF SC. & TEC
                      P A DAHM                      IOWA STATE UNIV. OF SC. & TEC
                      C V HALL                      IOWA STATE UNIV. OF SC. & TEC
                      A   KEMP                      IOWA STATE UNIV. OF SC. & TEC
   MILE: 09/76 -GRANT AWARD
         01/77 -INTERIM REPORT - CONTROL/DISPOSAL OF PESTICIDE-RINSING WATER
         01/78 -INTERIM REPORT - FULL-SALE DEMONSTRATION
         06/79 -PROJECT COMPLETED
         08/79 -FINAL REPORT
     OBJECTIVES: 1. EVALUATE OVERALL EFFECTIVENESS OF THE DISPOSAL PITS
     CURRENTLY IN USE BASED ON MATERIALS PREVIOUSLY DEPOSITED IN EACH. 2.
     DETERMINE PRESENCE OR ABSENCE OF ENVIRONMENTALLY HAZARDOUS COMPOUNDS
     IN EACH. 3. CONTINUE TO SAMPLE EACH PIT DURING TENURE OF STUDY. 4. ESTA
     BLISH EXPERIMENTAL SYSTEMS FOR STUDYING THE FATE OF SELECTED PESTICIDES IN
     ISOLATED MICRO-PITS UNDER CONTROLLED CONDITIONS. 5. EVALUATE B
     IOLOGICAL ACTIVITY IN PRESENT SYSTEMS. 6. DEVELOP PLANS AND SPECIFICATIONS
     FOR DISPOSAL SYSTEM CONSTRUCTION AND MANAGEMENT. APPROACH: CONDUCT A 5 YR.
     CHEMICAL AND BIOLOGICAL STUDY OF 2 EXISTING PESTICIDE DISPOSAL SYSTEMS
     USED AT THE AGRONOMY-AG. ENGINEERING AND HORTICULTURE STATIONS WHICH HAVE
     BEEN IN USE 10 AND 5 YEARS RESPECTIVELY. ADDITIONAL CONTROLLED MICRO
     -DISPOSAL SYSTEMS WILL BE ESTABLISHED TO DETERMINE THE FATE AND BIOLOGICAL
     CONSEQUENCES OF KNOWN QUANTITIES OF SELECTED DISPOSED COMPOUNDS. ACCURATE
     DATA WILL BE COLLECTED ON IDENTITY, QUALITY AND CONCENTRATION OF UN
     USUAL DILUTE INSECTICIDES, FUNGICIDES AND HERBICIDES DEPOSITED IN EXISTING
     AND TWO NEW DISPOSAL PITS. RELIABLE RECOMMENDATIONS FOR DISPOSAL SYSTEMS
     FOR FARMS AND COMMERCIAL APPLICATION SHOULD BE DEVELOPED AS A RESULT OF
      THE STUDY. CURRENT PLANS: CHEMICAL AND BIOLOGICAL STUDIES OF THE EX
     ISTING SYSTEMS WILL BE INITIATED IN MAY, 1976 WITH THE NEW MICRO AND MACRO
      EXPERIMENTAL PITS BEING DEVELOPED DURING THE SUMMER. BASED ON 1976
     STUDIES, AN IMPROVED COMMERCIAL APPLICATOR, RESEARCH-STATION TYPE PIT
     SYSTEM WILL BE IMPLEMENTED IN 1977 BASED ON THE 1976 RESULTS. CLIMAT
     OLOGICAL DATA WILL BE COLLECTED DURING THE 5 YR. STUDY AND CORRELATED WITH
     CHEMICAL AND BIOLOGICAL DEGRADATION IN THE SYSTEMS.
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NON-POINT POLLUTION STUDIES ON AGRICULTURAL LAND USE TYPES PREVALENT IN
THE COASTAL PLAIN ZONE OF MARYLAND
   START/ COMPL DATE :    06/76 - 06/79 : FUNDING : EST. - FY   77  / $  208130
    TASK/EPA CODE :K6178-351     / R804536-01  (GRANT)  PRIOR  FY76 / $  4750001
   PROJECT OFFICER : W R  PAYNE
   INVESTIGATORS :   D L CORRELL                      SMITHSONIAN INSTITUTION
   MILE: 12/78 -DATA SET TO MODEL DEVELOPERS PLUS INTEPRETATION OF SPECIFI
     THIS RESEARCH PROPOSAL INVOLVES THE MODIFICATION AND EXPANSION OF A WATE
     RSHED MONITORING PROGRAM NOW IN OPERATION AT THE CHESAPEAKE BAY CENTER FOR
     ENVIRONMENTAL STUDIES.
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II-202

TOXICOLOGY OF PESTICIDES

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START/ COMPL DATE :    01/76 - 12/79 : FUNDING : EST, - FY   77  / $   25000
 TASK/EPA CODE :H615F-7627   / R804539-02  (GRANT)  PRIOR  FY76 / $   250001
PROJECT OFFICER : R L  BARON
INVESTIGATORS :   E   REINER                          INST, FOR MEDICAL RES,
MILE: 06/77 -ANNUAL REPORT
      06/80 -FINAL REPORT
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THE MAJOR OBJECTIVE OF THE STUDIES IS TO FIND OUT THE POSSIBILITY OF THE SAFE USE OF PESTICIDES AND TO ASSURE THAT USE PATTERNS AND HUMAN EXPOSURE ARE BELOW THE LEVELS THAT WILL DETRIMENTALLY AFFECT HEALTH AND WELL-BEING OF HUMANS. THIS OBJECTIVE WILL BE APPROACHED BY EXPANDING THE PRESENT KNOWLEDGE ABOUT THE MECHANISM OF ACTION OF PESTICIDES, AND BY COLLECTING AND INTERPRETING DATA ON EFFECTS OBSERVED IN INDIVIDUALS AND GROUPS EXPOSED TO PESTICIDES. THE STUDIES WILL COMPRISE THE FOLLOWING ASPECTS: ASSESSMENT OF BIOCHEMICAL AND CLINICAL EFFECTS OF PESTICIDES IN HUMANS (DETERMINATION OF CHOLINESTERASE ACTIVITIES AND VITAMIN A LEVELS IN BLOOD) EFFECT OF PESTICIDES ON EYE AND VISION, EFFECT OF PESTICIDES ON PSYCHOMOTOR PERFORMANCES, PESTICIDE RESIDUES IN HUMANS, AND STUDIES ON THE INTERACTION BETWEEN ESTERASES AND ORGANOPHOSPHORUS COMPOUNDS.

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TOXIC, SUBLETHAL AND LATENT EFFECTS OF SELECTED PETROLEUM HYDROCARBONS
AND BARIUM SULFATE ON MARINE ORGANISMS
   START/ COMPL DATE :    05/76 - 07/79 : FUNDING : EST. - FY   77  / $   85000
    TASK/EPA CODE :Q625F-1-06   / R804541-01  (GRANT)  PRIOR  FY76 / $  2210921
   PROJECT OFFICER : N L  RICHARDS
   INVESTIGATORS :    K R RAO                          STATE UNIVERSITY OF FLA. SYS.
   MILE: 07/77 -HOLD SYMPOSIUM ON PENTACHLOROPHENOL
         07/78 -PUBLISH SYMPOSIUM ON PENTACHLOROPHENOL
         05/78 -HOLD SYMPOSIUM ON DRILLING FLUIDS
         06/78 -HOLD SYMPOSIUM ON CARCINOGENS IN THE AQUATIC ENVIRONMENT
         09/79 -FINAL REPORT ON GRANT
    THIS INVESTIGATION WILL EXAMINE THE TOXIC, SUBLETHAL AND LATENT EFFECTS OF
     CERTAIN POLYCYCLIC AROMATIC HYDROCARBONS AND BARIUM SULFATE ON L
    ARVAL AND ADULT STAGES OF SELECTED INVERTEBRATES AND FISH, EXPERIMENTS ARF
     DESIGNED TO DETERMINE THE EFFECTS OF THESE COMPOUNDS ON: A) CRUSTACEAN
    MOLT CYCLES; B) REGENERATIVE LIMB GROWTH; C) RESPIRATION; D) HEART RATE;
    AND E) HISTOLOGY AND ULTRASTRUCTURE OF SELECTED TISSUES, STUDIES
     ARE AIMED TO DETERMINE THE UPTAKE BY MARINE ORGANISMS OF THESE POLLUTA
    NTS FROM WATER AND BIOACCUMULATION THROUGH AQUATIC FOOD CHAINS, BY USING A
     COMBINATION OF AUTORADIOGRAPHIC AND CONVENTIONAL ANALYTICAL
    TECHNIQUES THE SITES AND EXTENT OF ACCUMULATION OF POLLUTANTS IN MARINE
    ORGANISMS WILL BE DETERMINED.
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II-204

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MEASUREMENT OF HALOGENATED POLLUTANTS AND OTHER TRACE GASES IN THE
TROPOSPHERE IN SITU BY LONG-PATH INFRARED ABSORPTION SPECTROS
   START/ COMPL DATE :    06/77 - 05/78 : FUNDING : EST. - FY   77  / $   76961
    TASK/EPA CODE :G712B-BB-02  / R804546-02  (GRANT)  PRIOR  FY76 / $   690001
   PROJECT OFFICER : P     HANST
   INVESTIGATORS :    J N PITTS                       UNIV. OF CALIFORNIA
                      A M WINER                       UNIV. OF CALIFORNIA
                      R A GRAHAM                      UNIV. OF CALIFORNIA
                      E C TUAZON                      UNIV. OF CALIFORNIA
   MILE: 06/78 -FINAL REPORT
     A QUANTITATIVE CHARACTERIZATION OF AMBIENT PRIMARY AND SECONDARY TRACE
     POLLUTANT AS A FUNCTION OF TIME (BOTH DIURNALLY AND SEASONALLY) AND
     LOCATION (INCLUDING URBAN AREAS AND DOWNWIND RECEPTOR SITES) IS BEING COND
     UCTED USING IN SITU, LONG-PATH, HIGH RESOLUTION FOURIER TRANSFORM INFRARED
      SPECTROSCOPY IN CONJUNCTION WITH CONVENTIONAL A STATE-OF-THE-ART AN
     ALYTICAL METHODS FOR AMBIENT GAS PHASE AND PARTICULATE POLLUTANTS. RESULTS
     OF THE FIRST YEAR OF THIS PROGRAM AT RIVERSIDE INCLUDE THE FIRST POSI
     TIVE IDENTIFICATION BY SPECTROSCOPIC TECHNIQUES OF FORMALDEHYDE AND NITRIC
     ACID IN AMBIENT PHOTOCHEMICAL SMOG, THE MEASUREMENT OF LOW LEVELS OF FOR
     MIC ACID, AMMONIA AND A VARIETY OF HALOCARBONS, AND DETERMINATION OF UPPER
      LIMITS FOR THE POSSIBLE PRESENCE OF OTHER TRACE CONTAMINANTS.
      STUDIES WILL CONTINUE AT RIVERSIDE AND AT A MID-BASIN SITE, APPROXIMATELY
      FOUR TO SIX HOURS UPWIND OF RIVERSIDE, USING THE PART-PER-BILLION SENSI
     TIVITY AFFORDED BY A KILOMETER OPTICAL PATHLENGTH MULTIPLE REFLECTION CELL
     , AND AN FTS-14 FOURIER TRANSFORM INFRARED SPECTROMETER (BOTH OF WHICH ARE
      THE PROPERTY OF THE EPA AND ARE ON LOAN TO SAPRC FOR THIS THREE-YEAR
     PROJECT). PORTABLE INSTRUMENTATION CURRENTLY EMPLOYED IN GAS PHASE AND
     PARTICULATE AMBIENT AIR MONITORING STUDIES AT SAPRC ARE OPERATED IN CON
     JUNCTION WITH THE LPIR DURING SELECTED SMOG EPISODES AT THE MONITORING LOC
     ATIONS. THIS PROGRAM IS COORDINATED WITH AMBIENT AIR MONITORING STUDIES AT
     SAPRC SUPPORTED BY THE CALIFORNIA AIR RESOURCES BOARD AND THE DEVEL
     OPMENT OF AN EXPERIMENTALLY VALIDATED MODEL FOR PHOTOCHEMICAL SMOG, FUNDED
     THROUGH NSF-RANN. EMPHASIS IS BEING PLACED ON THE QUANTITATIVE D
     ETERMINATION OF PRODUCTS, LABILE INTERMEDIATES, AND PRIMARY POLLUTANTS FOR
      WHICH LITTLE, IF ANY, RELIABLE AMBIENT AIR DATA ARE CURRENTLY A
     VAILABLE. THESE NON-CRITERIA POLLUTANTS INCLUDE NITRIC ACID, NITROUS ACID,
     HALOCARBONS, HALOGENATED ACIDS, HYDROGEN PEROXIDE, NITROSAMINES, ALCOHOLS,
      EPOXIDES AND ORGANIC ACIDS, ALDEHYDES, AND OTHER CARBONYL COMPOUNDS.
     THESE ARE OF INTEREST PER SE, MAY BE TOXIC, AND ARE ALSO IMPORTANT FOR
     VALIDATING COMPUTERIZED KINETIC SMOG MODELS FOR CONTROL STRATEGIES.
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CHARACTERIZATION OF METAL COMPLEXES IN SEWAGE SLUDGE SYSTEMS

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START/ COMPL DATE :    08/76 - 08/79 : FUNDING : EST. - FY   77  / $   69039
 TASK/EPA CODE :C611B-7071    / R804547-02  (GRANT)  PRIOR  FY76 / $   833251
PROJECT OFFICER : J A  RYAN
INVESTIGATORS :   L E SOMMERS                        PURDUE UNIVERSITY
                  D W NELSON                         PURDUE UNIVERSITY
MILE: 09/76 -PROJECT START
      09/77 -INTERMEDIATE FUNDING
      09/78 -INTERMEDIATE FUNDING
      09/78 -INTERIM REPORT PUBLISHED
      08/79 -PROJECT COMPLETED
      10/79 -FINAL REPORT PUBLISHED
 TO CHARACTERIZE THE FORMS AND AMOUNT OF CU, ZN, NI, AND CD IN SEWAGE S
 LUDGES AND SOILS AMENDED WITH SEWAGE SLUDGE. TO DETERMINE THE STABILITY OF
 METALS ADDED TO SOILS BY SEWAGE SLUDGE APPLICATION AND THE EFFECTS OF SOIL
 FACTORS ON THEIR STABILITY AND BIOAVAILABILITY. RADIOISOTOPES, NON-AQUEOUS
  EXTRACTANTS, SPECIFIC METAL EXTRACTANTS, AND EGUILIBRATION TECHNIQUES
  WILL BE UTILIZED.
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II-206

PROCEDURE FOR EVALUATION OF POTENTIAL GROUNDWATER CONTAMINATION BY HAZARDOUS CHEMICALS

START/ COMPL DATE : 06/76 - 09/78 : FUNDING : EST. - FY 78 / $ 80000
TASK/EPA CODE :L609B-61 / R804549-02 (GRANT) PRIOR FY77 / $ 800001
PROJECT OFFICER : D C SHEW
INVESTIGATORS : G F LEE UNIV. OF TEXAS
MILE: 09/78 -FINAL REPORT

THE OBJECTIVE OF THIS STUDY IS TO CONTINUE WORK ON THE DEVELOPMENT OF A TEST PROCEDURE THAT COULD BE USED TO EVALUATE THE POTENTIAL FOR GROUNDWATER CONTAMINATION FROM AN ON-LAND INDUSTRIAL WASTE DISPOSAL OPERATION. PARTICULAR ATTENTION IS GIVEN TO THE DEVELOPMENT OF A STANDARD PERMEABILITY TEST FOR MEASUREMENT OF CONTAMINANT TRANSPORT THROUGH CLAYS AND OTHER COMPACTED MATERIALS THAT ARE USED AS LINERS FOR INDUSTRIAL WASTE DISPOSAL PITS. THE INFLUENCE OF ORGANIC SOLVENTS OF THE TYPES TYPICALLY USED IN VARIOUS CHEMICAL MANUFACTURING OPERATIONS ON CLAY STRUCTURE AND PERMEABILITY IS BEING EVALUATED. IT IS ANTICIPATED THAT THIS PHASE OF THE WORK WILL BE FOLLOWED BY COMBINED LABORATORY AND FIELD STUDIES TO EVALUATE THE RELIABILITY OF THE PERMEABILITY TEST THAT IS BEING DEVELOPED TO PREDICT ACTUAL TRANSPORT IN ENVIRONMENTAL SYSTEMS.

II 207

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A REAL-TIME MONITOR FOR AIRBORNE ASBESTOS FIBER CONCENTRATION

   START/ COMPL DATE :    07/76 - 01/78 : FUNDING : EST. - FY   77  / $   30000
    TASK/EPA CODE :G7128-BA-15  / R804562-01  (GRANT)  PRIOR  FY76 / $   430001
   PROJECT OFFICER : J    WAGMAN
   INVESTIGATORS :    R W DETENBECK                   UNIV. OF VERMONT ST. AGR. COL
                      D R HEMENWAY                    UNIV. OF VERMONT ST. AGR. COL
   MILE: 12/77 -BREADBOARD DEMONSTRATION
     OBJECTIVE IS TO BUILD A PROTOTYPE INSTRUMENT BASED ON THE USE OF
     LIGHT-SCATTERING DISSYMMETRY MEASUREMENTS FOR REAL-TIME IDENTIFICATION AND
     COUNTING OF AIRBORNE FIBERS. A LABORATORY "BREADBOARD"
     INSTRUMENT IS BEING ASSEMBLED TO DEMONSTRATE FEASIBILITY.
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MATHEMATICAL MODELS OF FATES OF POLLUTANTS IN ESTUARIES

START/ COMPL DATE : 07/76 - 01/79 : FUNDING : EST. - FY 77 / $ 136645
TASK/EPA CODE :Q608C-1-01 / R804563-02 (GRANT) PRIOR FY76 / $ 1306811
PROJECT OFFICER : T T DAVIES
INVESTIGATORS : D J OCONNOR MANHATTAN COLLEGE
J S JERIS MANHATTAN COLLEGE
W F MATYSTIK MANHATTAN COLLEGE
K J FARLEY MANHATTAN COLLEGE
MILE: 09/77 -REPORT ON TRANSPORT OF A TOXIC PESTICIDE IN THE JAMES RIVER EST
09/78 -REPORT ON ECOSYSTEM UPTAKE AND TRANSPORT OF KEPONE (MATH MODEL)
06/79 -FINAL REPORT ON MATH MODEL DEVELOPMENT FOR PESTICIDE MOVEMENT I

OBJECTIVES: THE QUANTIFICATION OF THE INTER-RELATIONSHIPS AMONG PHYSICAL, CHEMICAL, AND BIOLOGICAL VARIABLES OF ESTUARINE SYSTEMS, INCLUDING ANALYSIS OF TWO-LAYERED ESTUARINE TRANSPORT, EFFECTS ON SUSPENDED SOLIDS AND SALINITY, ADSORPTION/DESORPTION MECHANISMS FOR HAZARDOUS SUBSTANCES, AND FOOD CHAIN IMPLICATIONS. APPROACH: THE DEVELOPMENT OF A MATHEMATICAL MODEL CHARACTERIZING ESTUARINE TRANSPORT, VERIFYING THIS MODEL USING FIELD DATA FOR VELOCITY PROFILES AND SALINITY AND SOLIDS DISTRIBUTION.

CURRENT PLANS/PROGRESS: A MODEL DESCRIBING ESTUARINE TRANSPORT HAS BEEN DEVELOPED. SPECIFIC APPLICATION WILL BE MADE TO THE JAMES RIVER ESTUARY IN ORDER TO ADDRESS KEPONE CONTAMINATION PROBLEMS.

CHARGED MEMBRANE ULTRAFILTRATION AND SULFIDE PRECIPITATION TO TREAT NON-FERROUS METAL PRODUCTION WASTES

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   START/ COMPL DATE :    10/77 - 09/78 : FUNDING : EST. - FY   77  / $   16000
    TASK/EPA CODE :B610C-171    / R804568-02  (GRANT)  PRIOR  FY76 / $   370001
   PROJECT OFFICER : D    WILSON
   INVESTIGATORS :   R B GRIEVES                           UNIV. OF KENTUCKY
                     D   BHATTACHARYYA                     UNIV. OF KENTUCKY
   MILE: 07/77 -FUNDING PACKAGE SUBMITTED
         10/77 -AWARD FUNDS FOR PROJECT
         06/78 -DRAFT FINAL REPORT
         09/78 -FINAL REPORT RECEIVED
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THE OVERALL OBJECTIVE OF THIS PROJECT CONTINUES TO BE THE BENCH-SCALE INVESTIGATION OF SULFIDE (COMBINATION LIME-SULFIDE) PRECIPITATION WITH SOLUBLE AND SPARINGLY SOLUBLE SULFIDE SALTS AND OF CHARGED MEMBRANE ULTRAFILTRATION WITH COMMERCIALLY AVAILABLE, NEGATIVELY CHARGED, NON-CELLULOSIC MEMBRANES FOR TREATING SPECIFIC WASTE STREAMS FROM THE COPPER AND ZINC INDUSTRIES. THE SPECIFIC WASTE STREAMS (CONTAINING AS, SE, CD, ZN, FE, PB, ETC.) INCLUDE ACID PLANT WASTE-SCRUBBER WASTE AND THE OVERFLOW FROM LIME-SETTLING OPERATIONS. CONTINOUS FLOW, BENCH-SCALE SULFIDE PRECIPITATION STUDIES WILL INCLUDE THE USE OF NA2S AND FE S (OR PYRITES). THE SULFIDE DOSAGE REQUIREMENTS AND PREDICTIONS WITH VARYING WASTE COMPOSITIONS AND OPTIMUM PRECIPITATE SETTLING CONDITIONS WILL BE ESTABLISHED. CHARGED MEMBRANE ULTRAFILTRATION WILL BE EVALUATED IN TERMS OF HIGH WATER RECOVERY, MAXIMUM EXTENT OF METALS REMOVAL WITH SINGLE TO MULTIPLE-PASS WATER RECYCLE, AND THE POSSIBILITY OF OBTAINING 98% WATER RECOVERY BY AN INTERMEDIATE SETTLING STEP. THE STUDIES CONDUCTED DURING THE FIRST BUDGET PERIOD SHOW VERY PROMISING HEAVY METALS SEPARATION IN TERMS OF MEETING BATEA STANDARDS AND/OR FOR IN-PLANT WATER REUSE.

SEWAGZ SLUDGE--VIRAL AND PATHOGENIC AGENTS IN SOIL-PLANT-ANIMAL SYSTEMS

START/ COMPL DATE : 09/77 - 09/78 : FUNDING : EST. - FY 77 / $ 274000
TASK/EPA CODE :D607A-006 / R804570-02 (GRANT) PRIOR FY76 / $ 2662731
PROJECT OFFICER : H PAHREN
INVESTIGATORS : J M DAVIDSON STATE UNIVERSITY OF FLA. SYS.
G T EDDS STATE UNIVERSITY OF FLA. SYS.
MILE: 07/78 -INTERIM REPORT
10/79 -FINAL REPORT
12/79 -CONDUCT SYMPOSIUM

RECYCLING DIGESTED MUNICIPAL SEWAGE SLUDGE IN AGRICULTURAL SYSTEMS IS AN ATTRACTIVE ALTERNATIVE METHOD IF "SAFE" DISPOSAL MANAGEMENT TECHNIQUES CAN BE DEVISED THAT DO NOT ENDANGER HUMAN HEALTH. SLUDGE MAY CONTAIN HAZARDOUS AMOUNTS OF BACTERIAL AND VIRAL PATHOGENS, HEAVY METALS, CHEMICALS, DRUGS, MYCOTOXINS, AND/OR PARASITES. ANIMALS PRODUCED FROM GRAINS AND/OR FORAGES FERTILIZED WITH SLUDGE OR FROM PASTURES WHICH ALLOW DIRECT INGESTION OF SLUDGE WILL BE EXAMINED REGULARLY FOR THEIR PHYSIOLOGY, BLOOD CHEMISTRY, WEIGHT GAIN, AND PERFORMANCE. ANIMAL CARCASSES, INCLUDING BONE AND ORGANS, WILL BE EXAMINED FOR PATHOGENS, HEAVY METALS, DRUGS, CHEMICALS, AND MYCOTOXINS. ASSESSMENT WILL BE MADE OF POSSIBLE ENTRY OF SUCH DELETERIOUS MATERIALS INTO THE HUMAN FOOD CHAIN AS WELL AS IDENTIFICATION OF MANAGEMENT PRACTICES, RATES OF SLUDGE APPLICATION, AND CUMULATIVE EFFECTS ON CATTLE, SWINE, AND POULTRY, THREE IMPORTANT FOOD ANIMALS. CHARACTERIZATION OF THE SLUDGE PRIOR TO UTILIZATION WILL BE MADE AND MANAGEMENT PRACTICES DEVELOPED TO REDUCE THE POTENTIAL HAZARDS TO ACCEPTABLE LEVELS. PRELIMINARY TRIALS WITH DIRECT FEEDING OF DRIED SLUDGE TO CATTLE REDUCED WEIGHT GAINS SLIGHTLY AND CHANGED THE HEAVY METAL CONTENT OF CERTAIN ORGANS. IN A RELATED TRIAL, 11 BRED GILTS FED RATIONS CONTAINING EITHER 0, 10, OR 20 PERCENT DRIED SEWAGE SLUDGE FOR 10 MONTHS SHOWED NEITHER GROWTH SUPPRESSION, NOR EFFECT ON LITTER SIZE NOR PERFORMANCE. HOWEVER, SIGNIFICANT DIFFERENCES IN HEMATOCRIT AND PROTHROMBIN LEVELS OCCURRED BETWEEN PIGS FROM THE THREE GROUPS.

II-210.A

GRANULAR ACTIVATED CARBON STUDIES

START/ COMPL DATE : 08/76 - 07/79 : FUNDING : EST. - FY 77 / $ 11250
TASK/EPA CODE :C614A-7151 / R804571-01 (GRANT) PRIOR FY76 / $ 5918141
PROJECT OFFICER : J DEMARCO

INVESTIGATORS :	N V BRODMANN	JEFFERSON PARISH WATER DEPT.
	D B GREENBERG	JEFFERSON PARISH WATER DEPT.
	L R COLLINS	JEFFERSON PARISH WATER DEPT.
	J F RYAN	GULF SOUTH RESEARCH INSTITUTE

MILE: 10/77 -INTERIM REPORT
10/78 -INTERIM REPORT
11/79 -FINAL REPORT

BECAUSE OF GROWING PUBLIC CONCERN OVER THE OCCURRENCE OF TRACE AMOUNTS OF VARIOUS ORGANIC CHEMICALS IN THE AREA POTABLE WATER SUPPLY, THE JEFFERSON PARISH WATER DEPARTMENT HAS RECOGNIZED THE NEED FOR A MORE EFFICIENT AND RELIABLE TREATMENT PROCESS DESIGNED TO REMOVE SUCH CONTAMINANTS. THE MISSISSIPPI RIVER IS THE SOLE RAW WATER SOURCE AVAILABLE TO THE JEFFERSON PARISH WATER SYSTEM. THEREFORE, SINCE THE USE OF ANOTHER LESS POLLUTED SOURCE IS IMPOSSIBLE, THE DEPARTMENT IS FACED ONLY WITH SEEKING OUT NEW METHODS FOR REMOVAL OF TRACE LEVELS OF ORGANIC CONTAMINANTS. ONE SUCH METHOD OFFERS THE MOST PROMISE OF EFFECTING TRACE ORGANIC COMPOUND REMOVAL. IT IS THE USE OF GRANULAR ACTIVATED CARBON (GAC) FILTRATION. GAC FILTRATION WILL BE THOROUGHLY STUDIED IN QUANTITATIVE TERMS AND IN TERMS OF COST EFFECTIVENESS DURING THE COURSE OF THIS STUDY.

IMPACT OF ZOOPLANKTON GRAZING UPON PHYTOPLANKTON IN EUTROPHIC SAGINAW BAY AND WESTERN LAKE ERIE

START/ COMPL DATE : 05/76 - 05/78 : FUNDING : EST. - FY 77 / $ 77600
TASK/EPA CODE :N608A-022 / R804573 (GRANT) PRIOR FY76 / $ 740001
PROJECT OFFICER : N A THOMAS
INVESTIGATORS : D C MCNAUGHT STATE UNIVERSITY OF NEW YORK
MILE: 04/77 -ANNUAL REPORT
04/78 -ANNUAL REPORT
04/79 -ANNUAL REPORT

THE ABILITY OF THE HERBIVOROUS ZOOPLANKTON TO REGULATE ALGAL PRODUCTIVITY IN HIGHLY EUTROPHIC SAGINAW BAY (LAKE HURON) AND WESTERN LAKE ERIE WILL BE DETERMINED. TOTAL GRAZING, AS WELL AS SIZE-SELECTIVE FEEDING ON SMALL FLAGELLATES AS WELL AS LARGE DIATOMS AND BLUE-GREEN ALGAE WILL BE MEASURED IN THE FIELD. THIS INFORMATION ON IMPORTANT CARBON FLUXES IS VITAL TO THE MODELING TEAM RESPONSIBLE FOR THE ULTIMATE SYNTHESIS OF DATA ON GREAT LAKES ECOSYSTEMS. FIELD STUDIES OF GRAZING WILL DEPEND ON 14C TAGGING TECHNIQUES. IN THE LABORATORY THE FEEDING HABITS OF ROTIFERS, OFTEN IGNORED, WILL BE INVESTIGATED USING NEW PARTICLE COUNTING TECHNIQUES COMBINED WITH COMPUTER ANALYSIS. ALL OF THESE INVESTIGATIONS WILL BE BASED ON PROGRESS MADE BY AN EXPERIMENTAL TEAM DURING UPPER LAKES REFERENCE STUDY. RESULTS ALREADY SHOW THAT THE CRUSTACEANS CONTROL ALGAL PRODUCTION IN OPEN LAKE ONLY DURING THE FALL MONTHS. BIOLOGICAL CONTROL OF THE GROWTH OF BLUE-GREEN ALGAE FAILED TO DEVELOP IN MID-SUMMER. DISCOVERY OF THE DEGREE OF BIOLOGICAL CONTROL IN THE MOST EUTROPHIC AREAS OF THE GREAT LAKES IS VITAL TO UNDERSTANDING THE FUNCTIONING OF THESE ECOSYTEMS, ULTIMATELY PRODUCING VALIDATED SIMULATION MODELS FOR THEM, AND FINALLY MANAGING ALGAL BLOOM PROBLEMS.

EFFECT OF ETIOLOGICALLY DEFINED RESPIRATORY INFECTIONS ON LUNG FUNCTION AND ITS GROWTH IN AN AREA OF LOW AIR POLLUTION

START/ COMPL DATE : 11/72 - 12/80 : FUNDING : EST. - FY 77 / $ 217000
TASK/EPA CODE :H601C-7221 / R804577 (GRANT) PRIOR FY76 / $ 2000001
PROJECT OFFICER : B T KETCHAM
INVESTIGATORS : A M COLLIER UNIV. OF NORTH CAROLINA
MILE: 01/78 -PUBLICATION OF GROWTH OF LUNG FUNCTION DATA OF PRESENT STUDY PC

OBJECTIVE: THE OBJECTIVE OF THIS STUDY IS TO PROVIDE BASELINE PULMONARY FUNCTION DATA ON CHILDREN LIVING AND GROWING IN AN AREA OF LOW ENVIRONMENTAL POLLUTION. APPROACH: CHILDREN WILL BE STUDIED LONGITUDINALLY TO CHARACTERIZE PULMONARY FUNCTION CHANGES ASSOCIATED WITH PHYSICAL GROWTH AND DOCUMENTED UPPER RESPIRATORY INFECTIONS. CHILDREN WILL BE CULTURED FOR PATHOGENS AT TWO-WEEK INTERVALS REGARDLESS OF SYMPTOMATOLOGY AND MEASUREMENTS MADE WILL ASSESS THE IMPACT OF THESE INFECTIOUS AGENTS ON PULMONARY FUNCTION. OUTPUT: THIS INFORMATION WILL ENABLE THE DESIGN OF BETTER STUDIES TO ASSESS THE GROWTH OF LUNG FUNCTION AND IMPACT OF RESPIRATORY INFECTIONS ON YOUNG CHILDREN LIVING IN AREAS OF HIGH AIR POLLUTION.

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EFFECT OF PARTICULATES ON OZONE DISINFECTION OF BACTERIA AND VIRUSES IN
WATER
   START/ COMPL DATE :    08/76 - 08/78 : FUNDING : EST. - FY   77  / $   58555
    TASK/EPA CODE :C614A-7184    / R804587-02  (GRANT)  PRIOR  FY76 / $   540371
   PROJECT OFFICER : J C  HOFF
   INVESTIGATORS :    D J SPROUL                        UNIV. OF MAINE
   MILE: 09/76 -PROJECT START
         08/77 -CONTINUATION FUNDING PACKAGE PROCESSED
         12/77 -ANNUAL REPORT
         09/78 -PROJECT COMPLETED
         12/78 -FINAL REPORT PUBLISHED
     THE PRINCIPAL OBJECTIVE OF THIS PROJECT IS TO DEVELOP A BODY OF INFO
     RMATION ON THE DISINFECTION POTENTIAL OF OZONE FOR VIRUSES WHICH HAVE BEEN
     ATTACHED TO OR INCORPORATED WITHIN VARIOUS SOLIDS. THE SOLIDS TO BE USED
      WILL BE CLAYS, HYDRATED ALUMINUM OXIDE FLOCS, HUMAN EPITHELIOID CARCINOMA
      CELLS AND FECAL MATERIAL. THE VIRUSES TO BE USED WILL BE POLIOVIRUS 1
      (MAHONEY), COXSACKIEVIRUS A9 AND THE F2 BACTERIOPHAGE. ADDITIONALLY,
     INFORMATION ON THE INACTIVATION OF ESCHERICHIA COLI AND STREPTOCOCCUS
     FECALIS UNDER CONDITIONS SIMILAR TO THE VIRUSES WILL BE OBTAINED. MODI
     FICATIONS TO OBTAIN ADDITIONAL INACTIVATION WILL BE MADE WHERE IT IS FOUND
     THAT ADSORBED OR PROTECTED VIRUSES ARE INACTIVATED AT A SLOWER RATE THAN
     THE UNPROTECTED VIRUS. THESE MODIFICATIONS WILL INCLUDE LONGER CONTAC
     T TIMES, INCREASED OZONE CONCENTRATIONS AND DECREASED PARTICLE SIZE IN THE
      CASE OF THE FECAL MATERIAL AND ALUMINUM OXIDE FLOC PARTICLES.
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REHABILITATION EFFECTS IN LONG LAKE, WASHINGTON

   START/ COMPL DATE :    07/76 - 06/79 : FUNDING : EST. - FY   77  / $   68500
    TASK/EPA CODE :M412A-08      / R804588-01  (GRANT)  PRIOR  FY76 / $   900001
   PROJECT OFFICER : S A  PETERSON
   INVESTIGATORS :    E P WELSH                      UNIV. OF WASHINGTON
   MILE: 06/79 -FINAL REPORT
     THE PURPOSE IS TO STUDY THE STATUS OF THE PHYTOPLANKTON AND ROOTED M
     ACROPHYTE COMMUNITIES, THE NUTRIENT LEVELS IN WATER AND SEDIMENT AND THEIR
      INTERCHANGE, AND THE NUTRIENT BUDGETS DURING THE ONE YEAR BEFORE AND
     ONE-TO-TWO YEARS FOLLOWING REHABILITATIVE MEASURES IN LONG LAKE.
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INVESTIGATION OF NEW TECHNIQUES FOR CONTROL OF SMELTER ARSENIC BEARING
WASTES
   START/ COMPL DATE :    10/77 - 09/78 : FUNDING : EST. - FY   77  / $   34000
    TASK/EPA CODE :B604C-161    / R804595-02  (GRANT)  PRIOR  FY76 / $  2160001
   PROJECT OFFICER : J O  BURCKLE
   INVESTIGATORS :     A   MEHTA                     MONTANA COL. OF MIN. SC. & TE
                       G   ZUCKER                    MONTANA COL. OF MIN. SC. & TE
                       L   TWIDWELL                  MONTANA COL. OF MIN. SC. & TE
                       F   DIEBOLD                   MONTANA COL. OF MIN. SC. & TE
                       R   MCCLINCY                  MONTANA COL. OF MIN. SC. & TE
   MILE: 08/77 -FUNDING PACKAGE SUBMITTED
         11/77 -AWARD FUNDS FOR PROJECT
         08/78 -COMPLETE TECHNICAL WORK
         09/78 -COMPLETE REPORT
         10/78 -FINAL REPORT RECEIVED
    IN JUNE, 1976, THE U.S. ENVIRONMENTAL PROTECTION AGENCY AWARDED A RESEARCH
     GRANT TO THE MINERAL RESEARCH CENTER TO CARRY OUT A RESEARCH I
    NVESTIGATION OF NEW TECHNIQUES FOR CONTROL OF SMELTER ARSENIC FLUE DUST WA
    STES.THE MINERAL RESEARCH CENTER IS STUDYING FIXATION OF ARSENIC FLUE DUST
     WASTES BY VARIOUS TECHNIQUES SUCH AS ARSENIC FIXATION BY MOLTEN WASTE
     SLAGS FROM DIFFERENT SMELTING OPERATION, FIXATION AT HIGH TEMPERATURES BY
     CLAYS, SOME INDUSTRIAL BY-PRODUCTS, AND PHOSPHATE ROCK, FIXATION BY CE
    MENT AND CONCRETE MIXTURES, AND FIXATION OF ARSENIC AT LOW TEMPERATURES BY
    CLAYS, PHOSPHATE ROCK, AND SOME INDUSTRIAL BY-PRODUCTS. INITIAL RESULTS
    OF ARSENIC INCORPORATION IN THESE MEDIA AND THE LEACH TEST RESULTS ARE E
    NCOURAGING. UNDER SUBCONTRACT, THE ANACONDA COMPANY RESEARCH LABORATORY IN
     TUCSON IS STUDYING THE EXTRACTION OF ARSENIC, BY CHEMICAL LEACHING, FROM
    THE FLUE DUST WASTES AND HAS RECENTLY STARTED TESTS ON FIXATION OF E
    XTRACTED ARSENIC IN AQUEOUS MEDIA. FIRST YEAR: A LITERATURE SEARCH AND REP
    ORT ON THE GEOCHEMISTRY, CHEMISTRY, AND METALLURGY OF ARSENIC WAS PREPARED
    TO PROVIDE GUIDANCE FOR THE LABORATORY STUDIES. LABORATORY FEASIBILITY
    STUDIES HAVE BEEN CONDUCTED TO SCREEN THE EFFECTIVENESS OF SELECTED FI
    XATION TECHNIQUES. PILOT PLANT STUDIES OF THE REMOVAL OF ARSENIC FROM FLUE
    DUST WASTES BY CHEMICAL LEACHING WERE ESSENTIALLY COMPLETED. SECOND YEAR:
     LEACHING TESTS OF THE "FIXED" PRODUCTS RESULTING FROM SEVERAL FIXATION
    TECHNIQUES WILL BE PERFORMED TO DETERMINE RESISTANCE TO LEACHING UNDER
    ENVIRONMENTAL CONDITIONS. STUDIES OF SEPARATION BY CHEMICAL LEACHING AND
    SUBSEQUENT FIXATION WILL BE COMPLETED.
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ENUMERATION OF SHIGELLA IN POLLUTED WATERS

   START/ COMPL DATE :    00/76 - 00/78 : FUNDING : EST. - FY   77  / $   19000
    TASK/EPA CODE :D607A-042    / R804596      (GRANT)  PRIOR  FY76 / $   190001
   PROJECT OFFICER : M A  LEVIN
   INVESTIGATORS :   V P OLIVIERI                     JOHNS HOPKINS UNIVERSITY
                     C I NOSS                         JOHNS HOPKINS UNIVERSITY
   MILE: 06/78 -DEVELOPMENT AND EVALUATION OF ENUMERATION METHOD
         12/78 -APPLICATION IN EPIDEMIOLOGICAL STUDIES
     THE OBJECTIVES OF THIS PROJECT IS TO DEVELOP RELIABLE CULTURE PROCEDURES
     AND TECHNIQUES TO RECOVER AND ENUMERATE SHIGELLA IN POLLUTED WATER.
     CONVENTIONAL ENRICHMENT MEDIA FOR SHIGELLA HAVE BEEN DEVELOPED TO ISOLATE
     THESE MICROORGANISMS FROM FECAL SPECIMENS FROM PATIENTS SUSPECTED OF
     HAVING SHIGELLOSIS. LEVELS OF SHIGELLA UNDER THESE CIRCUMSTANCES ARE
     GENERALLY HIGH. IN CONTAMINATED WATER, HOWEVER, THE LEVELS OF SHIGELLA
     RELATIVE TO INTERFERING MICROORGANISMS ARE EXCEPTIONALLY LOW. IN ADDITION,
      MANY OF THE INTERFERING MICROORGANISMS HAVE A BACTERICIDAL AND BA
     CTERIOSTATIC EFFECT ON SHIGELLA. ENRICHMENT MEDIA ARE BEING EVALUATED THAT
     MINIMIZE THE EFFECT OF ANTAGONISTIC MICROORGANISMS.
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RESEARCH ON AIR SAMPLING FILTER MEDIA

START/ COMPL DATE : 09/76 - 05/78 : FUNDING : EST. - FY 77 / $ 50000
TASK/EPA CODE :G7128-BE-37 / R804600-01 (GRANT) PRIOR FY76 / $ 710001
PROJECT OFFICER : T DZUBAY
INVESTIGATORS : B Y LIU UNIV. OF MINNESOTA
MILE: 12/79 -FINAL REPORT

THE PRIMARY OBJECTIVE OF THIS PROGRAM IS TO STUDY AIR SAMPLING FILTER MEDIA AND TO EVALUATE THE AVAILABLE COMMERCIAL FILTER MEDIA IN TERMS OF THEIR SAMPLING EFFICIENCY, RESISTANCE TO FLOW, DUST HOLDING CAPACITIES, MOISTURE RETENTION CHARACTERISTICS, AND OTHER PHYSICAL PROPERTIES OF INTEREST. ALL MAJOR COMMERCIAL FILTER MEDIA WILL BE STUDIED. THE END RESULT OF THE PROJECT WILL BE THE PREPARATION OF A "FILTER HANDBOOK" IN WHICH THE MAJOR FILTER CHARACTERISTICS ARE DESCRIBED. IN ADDITION, A CONCURRENT STUDY WILL BE UNDERTAKEN TO RELATE THE SAMPLING EFFICIENCY AND FLOW RESISTANCE OF FILTERS TO THOSE PREDICTED BY THEORY. ALSO, THE "SERIES FILTER" METHOD WILL BE STUDIED AS A POSSIBLE ALTERNATIVE TO THE DICHOTOMOUS SAMPLER FOR SEPARATING ATMOSPHERIC PARTICLES INTO A FINE AND A COARSE FRACTION WITH A CUT POINT NEAR 2.0 UM.

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INCIDENCE OF CHROMOSOMAL ABERRATIONS IN THE PERIPHERAL LYMPHOCYTES OF
COLLEGE STUDENTS AS A FUNCTION OF PHOTOCHEMICAL AIR POLLUTION
   START/ COMPL DATE :    08/76 - 06/79 : FUNDING : EST. - FY   77  / $  133000
    TASK/EPA CODE :H601C-7245   / R804606-02  (GRANT)  PRIOR  FY76 / $  2500001
   PROJECT OFFICER : D    CALAFIORE
   INVESTIGATORS :    A R MAGIE                    LOMA LINDA UNIVERSITY
                      W R CENTERWALL               LOMA LINDA UNIVERSITY
                      D E ABBEY                    LOMA LINDA UNIVERSITY
                      R L PHILLIPS                 LOMA LINDA UNIVERSITY
                      R O WEST                     LOMA LINDA UNIVERSITY
   MILE: 07/76 -AWARD GRANT
         07/77 -PROGRESS REPORT AND CONTINUATION
         11/78 -FINAL REPORT
    OBJECTIVES: TO DETERMINE WHETHER THE EXPERIENCE, AS DETERMINED BY THE
    INCIDENCE OF PERIPHERAL CHROMOSOMAL ABERRATIONS, OF YOUNG ADULTS
    EMIGRATING FROM AND IMMIGRATING TO AN AREA WITH PERPETUALLY HIGH
    LEVELS OF PHOTOCHEMICAL AIR POLLUTANTS DIFFERS SIGNIFICANTLY FROM STUDENTS
    ALREADY LIVING IN THE RESPECTIVE AREAS. SECONDARY OBJECTIVES INCLUDE THE
    INFLUENCE OF A CHANGE IN RESIDENCE ON THE INCIDENCE OF CHROMOSOMAL ABER
    RATIONS, THE PERSISTENCE OF CHROMOSOMAL ABERRATIONS ALREADY PRESENT AT THE
    TIME OF IMMIGRATION, AND THE EFFECT OF OTHER ENVIRONMENTAL AND LIFESTYLE
    FACTORS. APPROACH: 400 NON-SMOKING, NON-IMBIBING, NON-DRUG-USING NEW
    STUDENTS (AGES 17 TO 22) AT TWO SEVENTH-DAY ADVENTIST COLLEGES WERE
    PRE-SELECTED FOR THIS STUDY. OBJECTIVITY IN PREPARATION OF BLOOD CULTURE
     AND EVALUATION FOR CHROMOSOMAL ABERRATION IS ASSURRED SINCE NEITHER
    COLL BORATING LABORATORY KNOWS THE ORIGIN OF THE SAMPLES. CHROMOSOMES OF
    EACH STUDENT ARE EVALUATED FOR THE FREQUENCY OF BREAKS, GAPS, ISOGAPS,
     HYPO- AND HYPER-DIPLOIDY, ENDOREDUPLICATIONS, TERMINAL BLEBS, AND STABL
    E CHANGES SUCH AS DICENTRICS, QUADRIRADIALS, INVERSION, AND TRANSLOCATION.
     CURRENT PLANS AND/OR PROGRESS: LIFESTYLE AND DEMOGRAPHIC CHARACTER
    ISTICS OF THE SUBJECTS HAVE BEEN ANALYZED. THREE BLOOD SAMPLING PERIODS HA
    VE BEEN COMPLETED. THE FREQUENCY OF CHROMOSOMAL ABERRATIONS FROM THE FIRST
     BLOOD SAMPLES ARE BEING STATISTICALLY EVALUATED. CHROMOSOME SCORING OF
    THE OTHER SAMPLES IS CURRENTLY IN PROGRESS. IT IS PLANNED TO FOLLOW THIS
    GROUP OF STUDENTS INTO THEIR CHILD-BEARING YEARS TO DETERMINE IF
    OBSERVED CHROMOSOMAL ABERRATIONS HAVE ANY CORRELATION WITH THE OUTCOME OF
    PREGNANCIES.
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804607

II-219

The objective of this proposal is to ultimately measure HO_x species in air samples. This will be accomplished with the use of chemical amplifiers.

MECHANISM AND CONTROL OF RAINFALL RUNOFF IMPACT FROM LAND APPLICATION SITES

START/ COMPL DATE :   07/76 - 07/78 : FUNDING : EST. - FY   77 / $ 16999
TASK/EPA CODE :L617D-24   / R804608-02 (GRANT) PRIOR FY76 / $ 521721
PROJECT OFFICER : S C YIN
INVESTIGATORS :   P W WESTERMAN   UNIV. OF NORTH CAROLINA
M R OVERCASH   UNIV. OF NORTH CAROLINA
J C BARKER   UNIV. OF NORTH CAROLINA
F J HUMENIK   UNIV. OF NORTH CAROLINA
MILE: 07/76 -PROJECT INITIATION
07/78 -FINAL REPORT PUBLICATION

THE FOUR MAIN OBJECTIVES EVALUATE RAINFALL RUNOFF FROM PLOTS WHERE ANIMAL MANURE OR LAGOON EFFLUENT HAS BEEN APPLIED. THE OBJECTIVES ARE: 1. TO DETERMINE THE LONG-TERM (5-YEAR) CROP UPTAKE, SOIL ACCUMULATION, AND WATER-CARRIED MASS MOVEMENT FROM LAND APPLICATION PLOTS SPRINKLER IRRIGATED WITH SWINE LAGOON EFFLUENT; TWO SOIL-CROP SYSTEMS ARE BEING STUDIED. 2. TO DETERMINE THE IMPACT OF SWINE DRYLOT RUNOFF ON STREAM QUALITY IN THE COASTAL PLAIN. 3. TO DETERMINE THE QUANTITY AND QUALITY OF SUBSURFACE FLOW FROM SPRINKLER IRRIGATED PLOTS HAVING A PERMEABLE SURFACE LAYER AND A LOW-PERMEABILITY LAYER BEGINNING AT 25-50 CM. 4. TO DETERMINE THE EFFECTIVENESS OF VARIOUS LENGTHS OF GRASSED BUFFER ZONES IN REDUCING MASS AND CONCENTRATION IN RUNOFF FROM LAND APPLICATION PLOTS. THE RESEARCH APPROACH FOR THE SWINE DRYLOT STUDY IS TO USE AN ACTUAL PRODUCER SITE AND MONITOR STREAM QUALITY. THE OTHER THREE RESEARCH OBJECTIVES INVOLVE VARIOUS APPLICATION RATES AND BUFFER ZONE LENGTHS FOR SMALL PLOTS. DATA IS BEING COLLECTED FOR OBJECTIVE 1 FOR THE FIFTH YEAR AND OBJECTIVE 2 IS IN THE SECOND YEAR. INSTALLATION OF SAMPLERS SHOULD BE COMPLETE BY JUNE 1, 1977 FOR OBJECTIVES 3 AND 4.

NEW APPROACHES TO THE PRESERVATION OF CONTAMINANTS IN WATER SAMPLES

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START/ COMPL DATE :    08/76 - 08/79 : FUNDING : EST. - FY   77  / $   34995
 TASK/EPA CODE :A621A-42     / R804609-01  (GRANT)  PRIOR  FY76 / $   350001
PROJECT OFFICER : G    SIMES
INVESTIGATORS :   J   SAXENA                      SYRACUSE RESEARCH CORPORATION
MILE: 09/77 -EVAL. EFFECT. OF ANTIBIOTICS IN CONTROLLING WATER/WASTEWATER SA
      09/78 -EVAL. EFFECT. OF PRESERVATIVES IN DETAIL
 THE OVERALL OBJECTIVE OF THE THREE YEAR STUDY IS TO DEVISE A NEW, MORE E
FFECTIVE AND POLLUTION-FREE METHOD OF PRESERVATION OF WATER AND WASTEWATER
SAMPLES. APPROACHES SUCH AS THE USE OF ANTIBIOTICS AND BACTERIOLYTIC EN
ZYMES FOR CONTROLLING MICRO-ORGANISMS MAY OFFER A DISTINCT POSSIBILITY AND
AN IMPROVEMENT OVER EXISTING PROCEDURES. THE FIRST YEAR OF THE PROJECT
WAS DEVOTED TO EVALUATION OF THE EFFECTIVENESS OF SEVERAL ANTIB
IOTICS/ANTIBIOTICS MIXTURES AND BACTERIOLYTIC ENZYMES IN CONTROLLING MICRO
ORGANISMS IN WATER AND WASTEWATER SAMPLES AS REVEALED BY VIABLE CELL COUNT
 AND OXYGEN CONSUMPTION RATES. AFTER TESTING A LARGE NUMBER OF A
NTIBIOTICS SINGLY AND IN MIXTURE OF 2-4, 5-7 ANTIBIOTIC MIXTURES HAVE BEEN
SELECTED BASED ON THEIR EFFECTIVENESS IN CONTROLLING MICROORGANISM
S IN WASTEWATER AND NATURAL WATER SAMPLES. COMMERCIALLY AVAILABLE LYSOZYME
 PREPARATIONS FAILED TO CONTROL MICROORGANISMS WHEN ADDED WITH
 OR WITHOUT EDTA AND TRIS. ANALYSIS OF NUTRIENTS IN THE PRESENCE OF
ANTIBIOTICS HAS REVEALED THAT THE COMBINATIONS WHICH INCLUDE ERYTHR
OMYCIN OR AMPICILLIN CAUSE INTERFERENCE IN SOME ANALYTICAL DETERMINATIONS.
THE SECOND YEAR OF THE PROJECT WILL BE DEVOTED TO DETERMINATION OF THE
RELATIVE EFFECTIVENESS OF THE PRESERVATIVES SELECTED FOR FURTHER STUDY, IN
PREVENTING ALTERATION IN SAMPLE TEST PARAMETERS. THE EFFECT OF WATER PARAM
ETERS SUCH AS PH, PARTICULATE MATTER, INDUSTRIAL CONTAMINANT, ETC., ON THE
 PRESERVATION METHOD WILL ALSO BE ASCERTAINED. STUDIES WILL ALSO BE
INITIATED TO STUDY THE EFFECTIVENESS OF THE PRESERVATION METHOD AS A
FUNCTION OF STORAGE PARAMETERS AND SAMPLE HANDLING.
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II-222

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MAN'S EXPOSURE TO HALOGENATED ORGANICS FROM HIS DRINKING WATER

    START/ COMPL DATE :    10/76 - 00/00 : FUNDING : EST. - FY   77  / $  204645
     TASK/EPA CODE :D614B-047    / R804611-02  (GRANT)  PRIOR  FY76 / $  1629121
    PROJECT OFFICER : J    MCCABE
    INVESTIGATORS :   T M SHAFIK                      UNIV. OF MIAMI
                      J E DAVIES                      UNIV. OF MIAMI
                      C D PFAFFENBERGER               UNIV. OF MIAMI
                      A   PEOPLES                     UNIV. OF MIAMI
    MILE: 09/77 -REPORT
          09/78 -REPORT
          09/79 -REPORT
      OBJECTIVES: THE OBJECTIVE OF THIS WORK IS TO DETERMINE THE LEVELS OF HALOG
      ENATED VOLATILE PURGABLES, VOLATILE NON-PURGABLES, AND HALOGENATED PHENOLS
       IN DRINKING WATER, HUMAN BLOOD, AND HUMAN ADIPOSE TISSUE AND TO CORRE
      LATE THE CONCENTRATION OF THESE TOXICANTS WITH THE LEVELS FOUND IN MIAMI'S
       DRINKING WATER. APPROACH: DEVELOP METHODOLOGIES FOR THESE THREE GROUP
      S OF TOXICANTS IN WATER, BLOOD AND ADIPOSE TISSUE. DOSE EXPERIMENTAL ANIMA
      LS WITH THESE CHEMICALS TO DETERMINE LEVELS IN BLOOD AND FAT TISSUES TO ES
      TABLISH IF THESE HALOGENATED CHEMICALS BIOACCUMULATE IN FATTY TISSUES, AND
       WHAT TYPE OF EQUILIBRIUM OCCURS FOR THESE CHEMICALS BETWEEN BLOOD AND
      FAT. THE ANIMAL STUDIES WILL LEAD TO THE FINAL PORTION OF THE INVE
      STIGATION WHICH IS A PILOT EPIDEMIOLOGICAL STUDY TO RELATE LEVELS OF THESE
      TOXICANTS IN DRINKING WATER WITH THE LEVELS DETECTED IN HUMAN BLOOD AND
      ADIPOSE TISSUE. CURRENT PLANS AND/OR PROGRESS: THE HALOGENATED PURGABLE
      VOLATILES AND A FEW HALOGENATED NON-PURGABLE VOLATILES AND NON-PUR
      GABLE NON-VOLATILES HAVE BEEN DETECTED IN MUNICIPAL WATER, HUMAN SERUM AND
       ADIPOSE TISSUE. NEGLIGIBLE AMOUNTS OF THESE TOXICANTS WERE FOUND IN WELL
      AND BOTTLED WATER. IN GENERAL, THE PRELIMINARY DATA INDICATE THAT THE
       APPROACH IN THIS STUDY IS FEASIBLE, AND THESE TOXICANTS ARE PRESENT IN
      THE GENERAL POPULATION AT LOW LEVELS.
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II-223

LIMNOLOGICAL INVESTIGATIONS OF WATER QUALITY AND FISH LARVAE IN LAKE ERIE

START/ COMPL DATE : 04/76 - 04/79 : FUNDING : EST. - FY 77 / $ 165537
TASK/EPA CODE :N608A-006 / R804612 (GRANT) PRIOR FY76 / $ 1384281
PROJECT OFFICER : N A THOMAS
INVESTIGATORS : C E HERDENDORF OHIO STATE UNIVERSITY
MILE: 05/77 -ANNUAL REPORT
05/78 -FINAL REPORT

THE OHIO STATE UNIVERSITY, CENTER FOR LAKE ERIE AREA RESEARCH (CLEAR) PROPOSES TO CONDUCT STUDIES OF (1) WATER QUALITY, PARTICULARLY NUTRIENTS/OXYGEN RELATIONSHIPS, IN THE WESTERN AND CENTRAL BASINS OF LAKE ERIE AND (2) FISH LARVAE IN THE WESTERN BASIN AND SANDUSKY BAY. A COMPREHENSIVE STUDY OF THE STATUS OF EUTROPHICATION IN LAKE ERIE IS NOW BEING COMPLETED BY CLEAR IN SUPPORT OF AN ASSESSMENT OF THE EFFECTIVENESS OF NUTRIENT CONTROL PROGRAMS. A SUBPROJECT OF THIS GRANT DEALS WITH POPULATIONS ESTIMATES OF FISH LARVAE IN WESTERN LAKE ERIE. DATA GENERATED BY THESE STUDIES ALSO FORM THE BASE OF DETERMINISTIC MODELS NOW UNDER DEVELOPMENT BY EPA, LARGE LAKES RESEARCH STATION, GROSSE ILE, MICHIGAN. THE PROPOSED PROJECT WILL BUILD ON THE INFORMATION OBTAINED THROUGH THE CURRENT PROJECT. THE GENERAL OBJECTIVES OF THE PROPOSED WORK INCLUDE: 1. TO DETERMINE THE CONCENTRATION AND QUANTITY OF NUTRIENTS, OXYGEN AND BIOMASS INDICATORS IN THE WATERS OF THE CENTRAL AND WESTERN BASINS OF LAKE ERIE. 2. TO DETERMINE THE KINDS AND QUANTITIES OF CONTAMINANTS ENTERING WESTERN LAKE ERIE UNDER "RUNOFF EVENT" CONDITIONS AND TO IDENTIFY DISTRIBUTION PATTERNS IN THE LAKE. 3. TO ESTIMATE FISH LARVAE POPULATIONS IN WESTERN LAKE ERIE AND TO ASSESS THE IMPACT OF INTAKE ENTRAINMENT ON THESE POPULATIONS.

II-224

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BIO-ORGANIC INDICATORS OF GROUND-WATER POLLUTION

    START/ COMPL DATE :    08/76 - 08/80 : FUNDING : EST, - FY   77  / $  169415
     TASK/EPA CODE :L6098-16      / R804613-02  (GRANT)  PRIOR  FY76 / $  1388061
    PROJECT OFFICER : W J  DUNLAP
    INVESTIGATORS :    L G MORRILL                       OKLA, ST, UNIV,
                       B C MAHILUM                       OKLA, ST, UNIV,
                       S H MOHIUDDIN                     OKLA, ST, UNIV,
                       F R LEACH                         OKLA, ST, UNIV,
                       J C CHANG                         OKLA, ST, UNIV,
                       J J WEBSTER                       OKLA, ST, UNIV,
                       V S CURTIS                        OKLA, ST, UNIV,
                       A B ARQUITT                       OKLA, ST, UNIV,
                       J L HOWARD                        OKLA, ST, UNIV,
    MILE: 12/77 -ORGANIC LITERATURE SEARCH
          12/77 -ATP LITERATURE SEARCH
     TO IDENTIFY BIOCHEMICAL AND ORGANIC INDICATORS OF GROUND-WATER POLLUTION,
     THIS PROJECT IS IN TWO PARTS: (1) BIOCHEMICAL INDICATORS: INVESTIGATE
     THE USE OF ATP, NUCLEIC ACID, PROTEINS, ORGANIC PHOSPHATES AND ENZ
     YMES AS INDICATORS, DEVELOPMENT OF EXTRACTION AND ANALYSIS TECHNIQUES; (2)
      ORGANIC INDICATORS: STUDY SORPTION, RETENTION, AND MODIFICATION OF
     ORGANIC COMPOUNDS THAT ARE ADDED OR ARISE BY MICROBIAL OR CHEMICAL ACTION,
     PREDICT FATE OF SUCH COMPOUNDS AND DEVELOP ANALYTICAL TECHNIQUES,
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ORGANIC SUBSTANCES IN THE OHIO RIVER AND ASSOCIATED WATER SUPPLIES

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START/ COMPL DATE :    10/76 - 10/78 : FUNDING : EST. - FY   77  / $  150000
 TASK/EPA CODE :C614A-7152   / R804615-02  (GRANT)  PRIOR  FY76 / $  1500001
PROJECT OFFICER : W    FEIGE
INVESTIGATORS :   W    RAZOR                     OHIO RIV. VALL. WTR. SAN. COM
                  R J  BOES                      OHIO RIV. VALL. WTR. SAN. COM
                  R    MILTNER                   OHIO RIV. VALL. WTR. SAN. COM
MILE: 10/76 -GRANT AWARDED
      10/77 -CONTINUATION GRANT AWARDED
      12/77 -INTERIM REPORT PUBLISHED
      10/78 -PROJECT COMPLETED
      01/79 -FINAL REPORT PUBLISHED
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THIS PROJECT IS DESIGNED TO COMPLEMENT U.S. EPA STUDIES OF ORGANIC MATERIALS IN PUBLIC WATER SUPPLIES AND WATER SUPPLY SOURCES THROUGHOUT THE COUNTRY. SPECIFIC OBJECTIVES ARE: 1. TO CONDUCT PLANT-SCALE EVALUATIONS OF THE INFLUENCE OF VARIOUS WATER TREATMENT PROCESSES, OR MODIFICATIONS OF THOSE PROCESSES, ON THE REMOVAL OF ORGANIC MATERIALS FROM THE RIVER WATER AND THE FORMATION OR REMOVAL OF HALOGENATED HYDROCARBONS; 2. TO EVALUATE THE EFFECT OF PRESENT PROCESSES FOR PUBLIC WATER SUPPLY TREATMENT ON THE ORGANICS IN THE TREATED WATER AND THE INFLUENCE OF SEASONAL AND OTHER VARIATIONS IN THE TYPE AND CONCENTRATION OF ORGANIC COMPOUNDS IN THE OHIO RIVER ON THE ORGANICS IN THE TREATED WATER. WITH THE COOPERATION AND FINANCIAL SUPPORT OF SOME PUBLIC WATER SUPPLY UTILITIES USING THE OHIO RIVER OR MAJOR TRIBUTARIES AS THE SOURCE OF WATER, PERIODIC RAW AND FINISHED WATER SAMPLES, GAS CHROMATOGRAPH ANALYSIS OF PURGEABLE AND SOLVENT EXTRACT PORTIONS WILL BE UTILIZED FOR DETECTION OF ORGANIC MATERIALS. TREATMENT PROCESSES IN SELECTED PLANTS WILL BE MODIFIED AND PROCESS SAMPLES WILL ALSO BE ANALYZED FOR ORGANICS. GC/MS EQUIPMENT WILL BE USED FOR IDENTIFICATION OF INDIVIDUAL COMPOUNDS. TOTAL AND FECAL COLIFORM AND TOTAL BACTERIAL DENSITIES WILL BE DETERMINED DURING ALL PLANT MODIFICATION STUDIES TO INSURE THAT THE BACTERIOLOGICAL QUALITY OF THE WATER IS NOT ADVERSELY AFFECTED.

II-226

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REDUCATION OF SALINE POLLUTION OF THE GROUNDWATER ATTRIBUTED TO DAIRY
OPERATIONS
   START/ COMPL DATE :     08/76 - 10/78 : FUNDING : EST, - FY   77  / $   32578
    TASK/EPA CODE :L617D-25      / R804620-02  (GRANT)  PRIOR  FY76 / $   674221
   PROJECT OFFICER : L R  SHUYLER
   INVESTIGATORS :   N    SMITH                     CHINO BASIN MUN, WATER DIST,
                     N    SMITH                     UNIV, OF CALIFORNIA
                     G    LOFGREEN                  UNIV, OF CALIFORNIA
                     R W  FERGUSON                  CHINO BASIN MUN, WATER DIST,
                     P    PRATT                     UNIV, OF CALIFORNIA
                     S    BISHOP                    UNIV, OF CALIFORNIA
                     D    BELL                      UNIV, OF CALIFORNIA
   MILE: 08/76 -PROJECT INITIATED
         10/77 -CONTINUATION FUNDING
         10/78 -FINAL REPORT PUBLICATION
     OBJECTIVES: EVALUATION OF GROUNDWATER QUALITY IN THE CHINO HYDROLOGIC B
     ASIN INDICATES DEGRADATION DUE TO SALINE POLLUTION LEACHED FROM THE WASTES
      OF DAIRY COWS, THE MANURE OF THESE ANIMALS IS KNOWN TO CONTAIN SOME NUT
     RITIONAL VALUE, TECHNOLOGY EXISTS BY WHICH THIS FEED CAN BE RECAPTURED, IF
     THE QUALITY OF THE FOOD PRODUCED IS COMPARABLE TO MORE NORMAL RATIONS A
     VIABLE MEANS OF WASTE DISPOSAL WILL BE AVAILABLE, THIS PROJECT IS DESIGNED
      TO TEST AND DEMONSTRATE THE VALUE OF THE FEED PRODUCED FROM COW MANURE,
     APPROACH: DAIRY COW MANURE WILL BE COLLECTED FROM DAIRIES IN SAN BERNARDIN
     O COUNTY AND CONVERTED TO FEED PRODUCTS, THIS FEED WILL BE PRESENTED UNDER
      TEST CONDITIONS TO GROWING DAIRY HEIFERS, BEEF CATTLE AND CHICKENS TO
     DETERMINE ITS VALUE IN COMPARISON TO STANDARD RATIONS, LABORATORY
     EVALUATIONS SHALL BE CONDUCTED TO DETERMINE THE ABILITY OF THE FEED TO
     SUPPORT THE GROWTH OF RUMEN MICROBES AND TO ASSAY THE AMINO ACID CONTENT
     OF THE FEED, TOXIC METAL DEPOSITS IN THE FECES, TISSUES AND ORGANS OF
     THE ANIMALS FED IN THE PROGRAM SHALL BE EVALUATED, CURRENT PLANS: THE VAR
     IOUS WORK PROJECTS OUTLINED IN THE APPROACH HAVE BEEN DELEGATED TO SEVERAL
     CAMPUSES OF THE UNIVERSITY OF CALIFORNIA AND SAN BERNARDINO STATE COLLEGE
      WHERE EXPERTS IN THE REQUIRED SCIENTIFIC FIELDS ARE ON STAFF, THESE
     PEOPLE WILL PERFORM THE WORK AND REPORT THEIR FINDINGS, SCHOOLS IN
     VOLVED: (A) UNIVERSITY OF CALIFORNIA, DAVIS; (B) UNIVERSITY OF CALIFORNIA,
     RIVERSIDE; (C) CALIFORNIA STATE COLLEGE, SAN BERNARDINO,
COMBINED TESTING PROTOCOL FOR DETECTING ENVIRONMENTAL MUTAGENIC AGENTS

   START/ COMPL DATE :    08/76 - 08/78 : FUNDING : EST. - FY   77  / $  115000
    TASK/EPA CODE :D625F-004     / R804621      (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : J F  STARA
   INVESTIGATORS :    M S LEGATOR                     UNIV. OF TEXAS
                      J F STARA                       U.S. ENVIRON. PROTECTION AGCY
   MILE: 08/78 -FINAL REPORT
     THE OBJECTIVE OF THIS RESEARCH PROPOSAL IS TO COMBINE INTO A SINGLE ANIMAL
      EXPERIMENT AT LEAST EIGHT PROCEDURES THAT HAVE BEEN UTILIZED HERETOFORE
     IN SEPARATE ANIMAL STUDIES FOR EVALUATING CHEMICAL MUTAGENS. THE INTEGR
     ATION OF THESE VARIOUS PROCEDURES WILL BE ATTMPTED WITHOUT SACRIFICING THE
      OPTIMUM CONDITIONS NEEDED FOR OBTAINING MAXIMUM RESULTS WHEN EACH
     PROCEDURE IS CARRIED OUT IN SEPARATE ANIMAL EXPERIMENTS. THE SUCCESSFUL
      COMPLETION OF THIS PROJECT SHOULD ALLOW A COMPLETE PROFILE OF THE
     ACTIVITY OF THE CHEMICAL IN THE ANIMAL TESTED, ALLOW CORRELATION OF THE
     VARIOUS TESTS TO BE MADE UNDER EXACTLY IDENTICAL CONDITIONS, AND REALIZE
     A SAVINGS IN TIME AND MONEY FOR THE IN-DEPTH CHARACTERIZATION OF
     CHEMICAL MUTAGENS.
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MICROCOSM AND THEORETICAL EVALUATION OF SUBSTITUTE CHEMICALS

   START/ COMPL DATE :     10/76 - 10/79 : FUNDING : EST. - FY   77  / $   50000
    TASK/EPA CODE :N714A-83       / R804622-02  (GRANT)  PRIOR  FY76 / $   430031
   PROJECT OFFICER : J G  EATON
   INVESTIGATORS :   C E WARREN
                     W J LISS                          OREGON STATE HIGHER EDUC. SYS
                     W E GINGERICH                     OREGON STATE HIGHER EDUC. SYS
                     W K SEIM                          OREGON STATE HIGHER EDUC. SYS
                                                       OREGON STATE HIGHER EDUC. SYS
   MILE: 09/76 -COMPLETE CONSTRUCTION OF TEST SYSTEMS AND ADD TEST ORGANISMS
         09/77 -ADD PESTICIDE TO TEST SYSTEMS AND BEGIN COLLECTION OF PERTURBED
         09/78 -CONTINUE COLLECTION OF MICROCOSM AND INDIVIDUAL ORGANISM EFFECT
         09/79 -COMPLETE ALL EXPERIMENTAL WORK
         10/79 -COMPLETE DRAFT OF FINAL REPORT
    THIS RESEARCH HAS THE OBJECTIVE OF DETERMINING THE EFFECTS OF DIELDRIN ON
    THE DYNAMICS OF POPULATIONS OF GUPPIES AND THEIR PREY
    ORGANISMS, AMPHIPODS, COPEPODS, AND MICROORGANISMS--I
    NTERACTING IN LABORATORY ECOSYSTEMS. THE PREY ORGANISMS OF THE GUPPIES ARE
     SUPPORTED PRIMARILY BY THE ADDITION OF FOOD MATERIAL PREPARED FROM
    DRIED ALFALFA, AND THE GUPPY POPULATIONS ARE EXPLOITED BY REMOVAL AT
    DIFFERENT RATES IN DIFFERENT TREATMENT. ANCILLARY AQUARIUM EXPERIMENTS ON
    THE EFFECTS OF THE PESTICIDE ON SURVIVAL, REPRODUCTION, AND GROWTH OF
    GUPPIES AND THEIR PREY ORGANISMS ARE CONDUCTED IN ORDER TO BE ABLE TO EV
    ALUATE, BY COMPARISON TO THE COYSYSTEM STUDY RESULTS, THE ADEQUACY OF SUCH
    RELATIVELY SIMPLE AND MORE GENERALLY EMPLOYED EXPERIMENTS FOR PREDICTING E
    FFECTS IN MORE COMPLEX ECOLOGICAL SYSTEMS. THESE AQUARIUM STUDIES WILL, IN
    ADDITION, PROVIDE INFORMATION OF VALUE IN INTERPRETING THE EFFECTS OF
    THE PESTICIDE IN THE LABORATORY ECOSYSTEM EXPERIMENTS.
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804623

II-229

Three major objectives established for this project were: 1) To teach health personnel, particularly those concerned with health of migrant, agricultural, and pesticide chemical workers and their families how to recognize, diagnose, treat and prevent pesticide illness and poisoning; 2) to develop a system to more accurately validate, verify and document the incidence of pesticide toxicology by introducing and making available the use of an acholest screening test; 3) to teach an additional core of individuals in "Train-the-trainer" programs how to use the newly developed training kit so that they, in turn, can teach others about pesticide illness.

A training program, including the text, was prepared and taught in 17 locations in the United States; additionally, 5 "Train-the-trainer" sessions were held to teach others to use the ten-module of slide-tape training kits which was developed. The use of an acholest screening test was demonstrated and kits were distributed to migrant and rural health clinics.

Evaluation summaries document that the programs were well received. Additional sessions are planned for areas not yet covered and where repeat performances are requested. Continued follow-up on the use of the acholest kit is planned.

NEW AMINE CARBAMATE GELATION TECHNIQUES FOR USE IN OIL SPILL RECOVERY OPERATIONS

START/ COMPL DATE : 05/77 - 05/78 : FUNDING : EST. - FY 77 / $ 29000
TASK/EPA CODE :B623C-602 / R804628-01 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : U FRANK
INVESTIGATORS : W W BANNISTER UNIV. OF LOWELL
A DONATELLI UNIV. OF LOWELL
J WALKINSHAW UNIV. OF LOWELL
MILE: 03/77 -FUNDING PACKAGE SUBMITTED
05/77 -AWARD FUNDS FOR PROJECT
03/78 -DRAFT FINAL REPORT
05/78 -FINAL REPORT RECEIVED

THE MAIN OBJECTIVE OF THIS RESEARCH IS TO DEVELOP FOR "REAL WORLD" SITUATIONS AND AMINE CARBAMATE GELATION TECHNIQUE TO FACILITATE THE REMOVAL OF PETROLEUM DERIVED OIL SPILLED ON OCEAN OR INLAND WATERS. THE SPECIFIC OBJECTIVES ARE: A. DETERMINATION OF PHYSICAL PROPERTIES OF A SELECTED GELLING AGENT (DEHYDROABIETYL AMINE), INCLUDING SOLUBILITY AND DETERGENCY DETERMINATIONS OF THE AGENT IN WATER/OIL MATRICES. B. DEVELOPMENT OF CARBAMATING AGENTS OTHER THAN CARBON DIOXIDE. C. DETERMINE THE FEASIBILITY OF OIL AND AGENT RECOVERY BY CENTRIFUGATION. D. PILOT STUDIES OF GELATION TECHNIQUE IN LARGE LABORATORY WAVE TANKS. E. FIELD TESTS OF GELATION TECHNIQUE AT EPA TEST FACILITIES. F. PRELIMINARY EVALUATION OF AGENT FOR GELLING NON PETROLEUM HAZARDOUS MATERIALS. G. PRELIMINARY EVALUATION OF THE GELATION TECHNIQUE'S UTILITY IN THE PROPHYLACTIC TREATMENT OF BEACH FRONTS.

EFFECT OF PASTURING ON NON-POINT SURFACE RUNOFF

START/ COMPL DATE : 11/76 - 10/79 : FUNDING : EST. - FY 77 / $ 87898
TASK/EPA CODE :L617D-29 / R804631-02 (GRANT) PRIOR FY76 / $ 886281
PROJECT OFFICER : R D KREIS
INVESTIGATORS : R K WHITE OHIO AGRIC. RES. & DEV. CENTE
R W VANKEUREN OHIO AGRIC. RES. & DEV. CENTE
L B OWENS U.S. DEPT. OF AGRICULTURE
W M EDWARDS U.S. DEPT. OF AGRICULTURE
MILE: 11/76 -PROJECT INITIATED
10/79 -FINAL PROJECT REPORT PUBLISHED

THIS PROJECT WILL OBTAIN HYDROLOGIC AND CHEMICAL DATA FOR RUNOFF EVENTS ON THREE SELECTED WATERSHEDS WITH DIFFERENT LIVESTOCK PASTURING REGIMES. THE HYDROCHEMICAL DATA WILL BE EVALUATED AND COMPARED TO HYDROLOGIC HISTORY OF THE WATERSHEDS TO IDENTIFY HYDROLOGIC FACTORS AND THE LIVESTOCK/AGRONOMIC MANAGEMENT PRACTICES THAT CONTRIBUTE TO OR DECREASE THE CONTRIBUTION OF POLLUTANTS TO NON-POINT SURFACE RUNOFF. ALSO THE DEGREE OF BACTERIAL POLLUTION PRESENT IN NON-POINT SURFACE RUNOFF FROM CATTLE PASTURES WILL BE ESTABLISHED. THIS DATA WILL BE USED IN DEVELOPING RUNOFF-LOADING MODELS FOR PASTURE LAND TO ASSESS NON-POINT SOURCE POLLUTION POTENTIAL. A MEMORANDUM OF UNDERSTANDING BETWEEN THE OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER (OARDC), WOOSTER, OHIO, AND THE USDA-ARS NORTH APPALACHIA EXPERIMENTAL WATERSHED (NAEW), COSHOCTON, OHIO, ENABLES THESE INSTITUTIONS TO CONDUCT COOPERATIVE RESEARCH. THE WATERSHEDS FOR THIS PROJECT HAVE OVER 30 YEARS OF HYDROLOGIC HISTORY. PASTURING REGIMES TO BE MONITORED ARE: 1) ROTATIONAL PASTURING OF CATTLE IN THE SUMMER AND WINTER FEEDING ON ONE WATERSHED WITH HAY BROUGHT TO IT, 2) SUMMER ROTATIONAL PASTURING ONLY, AND 3) WINTER PASTURE WHERE CATTLE ARE FED SAVED AUTUMN REGROWTH AND HAY HARVESTED ON THE SITE. PERIODIC SAMPLING OF STORM EVENTS HAS BEEN INITIATED FOR THE THREE PASTURED WATERSHEDS. ALSO, A FORESTED, CONTROL WATERSHED IS BEING SAMPLED (COMPOSITE). RUNOFF SAMPLES ARE BEING ANALYZED FOR N (NH3, NO2/NO3 AND TOTAL-N), TOTAL-P, TOC, COD, BOD, SEDIMENT YIELD AND SEDIMENT N AND P. THE PROJECT WAS INITIATED ON 11/1/76 AND WILL LAST THREE YEARS.

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WORKER REENTRY IN FLORIDA CITRUS - PESTICIDES IN THE AGRICULTURAL
ENVIRONMENT
   START/ COMPL DATE :    01/77 - 01/79 : FUNDING : EST. - FY   77  / $   52000
    TASK/EPA CODE :H615F-7629    / R804633     (GRANT)  PRIOR  FY    /         1
   PROJECT OFFICER : J      DAVIS
   INVESTIGATORS :    H N NIGG
                      H N NIGG                        STATE UNIVERSITY OF FLA. SYS.
                      J C ALLEN                       AGRIC. RES. & EDUC. CENTER
                      R F BROOKS                      STATE UNIVERSITY OF FLA. SYS.
                      H J REITZ                       STATE UNIVERSITY OF FLA. SYS.
  MILE: 04/77 -QUARTERLY REPORT                       STATE UNIVERSITY OF FLA. SYS.
        07/77 -QUARTERLY REPORT
        10/77 -QUARTERLY REPORT
        01/78 -ANNUAL REPORT
        04/78 -QUARTERLY REPORT
        07/78 -QUARTERLY REPORT
        10/78 -QUARTERLY REPORT
        01/79 -FINAL REPORT
   OBJECTIVES: A) TO CONSTRUCT THE DISLODGEABLE RESIDUE PROFILE OF ETHION
   (O,O,O',O'-TETRAETHYL S,S'-METHYLENE BISPHOSPHORODITHICATE), CARBOPH
   ENOTHION S-((P-CHLOROPHENYLTHIO) METHYL) O,O-DIETHYL PHOSPHORODITHIOATE, A
   ND DIOXATHION S,S'-P-DIOXANE-2,3-DIYL O,O-DIETHYL PHOSPHORODITHIOATE AND T
   HEIR OXON METABOLITES IN A FLORIDA ROUND ORANGE ECOSYSTEM. B) TO DETERMINE
    THE INFLUENCE OF ENVIRONMENTAL VARIABLES ON THESE PROFILES.
   APPROACH: A) EXPERIMENTS WILL BE CONDUCTED DURING THE PERIODS
   JUNE-AUG., NOV.-JAN., AND MAR.-JUNE. THESE PERIODS REPRESENT DISTINCTIVE
   ENVIRONMENTAL CONDITIONS IN FLORIDA. TEMPERATURE, HUMIDITY, FREE WATER ON
   LEAVES AND FRUIT, RAINFALL, SOLAR INCIDENCE, AND WIND SPEED AND DIRECTION
    WILL BE MONITORED DURING EACH EXPERIMENT. B) PESTICIDES WILL BE APPL
   IED WITH CONVENTIONAL MEANS, AND SAMPLING OF AIR, LEAVES, SOIL, FRUIT, AND
   COVER CROP WITH TIME WILL BE PERFORMED. GLC ANALYSES OF RESIDUE LEVELS
   WILL BE RUN WITH COMPLETE CHEMICAL CHARACTERIZATION OF CONVERSION PR
   ODUCTS. C) COMPREHENSIVE STATISTICAL ANALYSES WILL BE RUN ON THE DATA WITH
    PARTICULAR ATTENTION PAID TO THE CORRELATION OF RESIDUE LEVELS WITH
   ENVIRONMENTAL VARIABLES.
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EFFECTS OF VIRUS PARTICLE AGGREGATION ON THE DISINFECTION OF WATER
SUPPLIES
   START/ COMPL DATE :    08/76 - 09/79 : FUNDING : EST. - FY   77  / $  106133
    TASK/EPA CODE :C614 -7187    / R804635-02  (GRANT)  PRIOR  FY76 / $   999971
   PROJECT OFFICER : J     HOFF
   INVESTIGATORS :    D G SHARP                        UNIV. OF NORTH CAROLINA
                      J D JOHNSON                      UNIV. OF NORTH CAROLINA
                      R   FLOYD                        UNIV. OF NORTH CAROLINA
                      D C YOUNG                        UNIV. OF NORTH CAROLINA
   MILE: 08/76 -PROJECT START
         06/77 -INTERIM REPORT PUBLISHED
         07/77 -CONTINUATION FUNDING PACKAGE PROCESSED
         07/78 -CONTINUATION FUNDING PACKAGE PROCESSED
         10/78 -ANNUAL REPORT
         07/79 -PROJECT COMPLETED
         10/79 -FINAL REPORT PUBLISHED
      THE SURVIVAL OF VIRUS IN WATER TREATED WITH DISINFECTING AGENTS IS
      PRACTICALLY DEPENDENT ON THE PHYSICAL STATE OF THE VIRUS PARTICLES IN THE
      WATER. THIS RESEARCH IS DIRECTED TO REVEAL THE NATURE OF VIRION AGGRE
      GATION, TO MEASURE IT AS PRECISELY AS CAN BE, AND TO SEEK QUANTITATIVE REL
      ATIONSHIPS BETWEEN THE DATA SO GATHERED AND THE INACTIVATION RATE OF VIRUS
      INFECTIVITY TO DIFFERENT DISINFECTING AGENTS OPERATING ON THE AG
      GREGATED VIRUS. AGENTS OF PRIMARY INTEREST WILL BE VARIOUS ACTIVE FORMS OF
      CHLORINE AND VIRUSES OF CHIEF CONCERN WILL BE THOSE OF THE ENTERIC GROUP.
       QUANTITATIVE TECHNIQUES WILL BE USED FOR DIRECT OBSERVATION AND
      ASSAY OF VIRION AGGREGATION BY ELECTRON MICROSCOPY SUPPLEMENTED BY
      MORE SENSITIVE BUT LESS DIRECT DIFFERENTIAL ULTRACENTR
      IFUGATION. COMPLEX FORMATION BETWEEN VIRIONS AND PARTICULATE MATTER IN THE
      WATER WILL BE EXAMINED AS WELL AS THE EFFICIENCY OF CLUMPS OF VIRIONS TO
      PLAQUE FORMATION, THE POSSIBILITY THAT VIRUS MAY EXIST IN A
      CONFORMATIONALLY RESISTANT STATE, AND THE INCREASE OF TITER OF CHLOR
      INE-TREATED VIRUS THROUGH SUBSEQUENT AGGREGATION. THEN EXPERIMENTS WILL BE
      DONE BY A GROUP CONSISTING OF 2 HALOGEN CHEMISTS AND 2 VIROLOGISTS WITH O
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II-233-A

804639

A literature review was conducted to provide a basis for analyzing the results of previous tests on surface treatment agents, comparing agent effectiveness, and recommending agents for the preliminary field tests. Preliminary field tests of agent effectiveness, toxicity, and application techniques were undertaken on salt-marsh sections and simulated beaches. The surface treatment agents tested were film-forming agents (polyvinyl acetate, xanthan gum, citrus pectin, sodium silicate, and borate-silicate mixture), surfactant/dispersing agents (BP 1100-X, BP 1100-WD, and Exxon Corexit 7664), and a surfactant/collecting agent (Shell Oil Herder). From the results of the preliminary field tests, two film-forming agents, polyvinyl acetate and xanthan gum, and the surfactant/collecting agent, Shell Oil Herder, were recommended for and tested during the full-scale field tests at Sewaren Beach, New Jersey. In addition, a flowing film of water was tested for effectiveness as a surface treatment agent.

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OXIDATION OF WATER SUPPLY REFRACTORY SPECIES BY OZONE WITH ULTRAVIOLET
RADIATION
   START/ COMPL DATE :    09/76 - 08/79 : FUNDING : EST. - FY   77  / $   88914
    TASK/EPA CODE :C614 -7139   / R804640-02  (GRANT)  PRIOR  FY76 / $   580771
   PROJECT OFFICER : J K  CARSWELL
   INVESTIGATORS :    W H GLAZE                       NORTH TEXAS STATE UNIVERSITY
                      J E HENDERSON                   NORTH TEXAS STATE UNIVERSITY
                      R   RAWLEY                      NORTH TEXAS STATE UNIVERSITY
   MILE: 06/76 -PACKAGE PROCESSED
         09/76 -GRANT AWARDED
         03/77 -CONTINUATION FUNDING PACKAGE PROCESSED (02 YEAR)
         08/78 -CONTINUATION FUNDING PACKAGE PROCESSED (03 YEAR)
         09/77 -INTERIM REPORT PUBLISHED (02 YEAR)
         09/78 -INTERIM REPORT PUBLISHED (03 YEAR)
         08/79 -PROJECT COMPLETED
         11/79 -FINAL REPORT PUBLISHED
     THIS PROJECT WILL: A. INVESTIGATE THE FEASIBILITY FOR THE REMOVAL OF
     CERTAIN REFRACTORY ORGANIC COMPOUNDS FROM WATER AT THE CONCENTRATION LEVE
     LS AT WHICH SUCH COMPOUNDS ARE OFTEN FOUND IN RAW AND TREATED DRINKING WAT
     ER SUPPLIES. THE METHOD TO BE EXPLORED CONSISTS OF OXIDATION WITH OZONE/OX
     YGEN OR OZONE/AIR IN THE PRESENCE AND ABSENCE OF ULTRAVIOLET RADIATION. B.
      DETERMINE THE RATES OF OXIDATION OF SUCH COMPOUNDS UNDER VARIOUS
     REACTOR CONDITIONS, I.E. INTENSITY OF ULTRAVIOLET RADIATION, T
     EMPERATURE, CONCENTRATION, ETC. C. DETERMINE BY MS/GC THE INTERMEDIATE AND
     FINAL OXIDATION/PHOTOLYSIS PRODUCTS WHICH ARE FORMED FROM THE O3/UV
     TREATMENT OF A SERIES OF APPROPRIATE COMPOUNDS, INCLUDING: HALOMETHANE P
     RECURSORS (HUMIC ACIDS), HALOMETHANES INCLUDING PARTICULARLY CHLOROFORM, A
      POLYCYCLIC AROMATIC HYDROCARBON, POLYCHLORINATED BIPHENYLS, AND OTHER
     SELECTED ORGANICS WHICH OCCUR IN NATURAL AND TREATED WATERS. D.
     EVALUATE THE FEASIBILITY OF UTILIZING OZONE/UV TREATMENT AS A PRACTICAL
     MEANS OF REMOVING REFRACTORY ORGANICS FROM WATER, AND ESTABLISH THE
     DESIGN PARAMETERS FOR THE PROCESS AT AN APPROPRIATE SCALE.
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PRELIMINARY MULTI-MEDIA AND ASSESSMENT OF POLLUTION PROBLEMS IN THE FOOD
 INDUSTRY
   START/ COMPL DATE :    04/77 - 10/77 : FUNDING : EST. - FY   77  / $   47000
    TASK/EPA CODE :1B604B-084    / R804642-02  (GRANT)  PRIOR  FY76 / $   850001
   PROJECT OFFICER : K A  DOSTAL
   INVESTIGATORS :   J L JONES                        SRI INTERNATIONAL
   MILE: 04/77 -FUNDING PACKAGE SUBMITTED
         04/77 -AWARD FUNDS
         10/77 -FINAL REPORT RECEIVED
     OBJECTIVES: THIS PROJECT ENTITLED "IDENTIFICATION OF THE RESEARCH,
     DEVELOPMENT AND DEMONSTRATION NEEDS FOR POLLUTION CONTROL IN THE FOOD
     INDUSTRY," IS TO IDENTIFY THE PRELIMINARY MULTI-MEDIA ENVIRONMENTAL EMISS
     IONS FOR PREVENTION AND CONTROL OF AIR, LAND, AND WATER POLLUTION FROM THE
     FOOD INDUSTRY AND TO DISCUSS METHODS OF SETTING PROGRAM PRIORITIES.
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II-236

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DETECTION OF CARCINOGENICITY OF OILS IN SEA WATER - USE OF HYBRID FISH
AND FOOD CHAINS
   START/ COMPL DATE :    08/76 - 08/79 : FUNDING : EST. - FY   77  / $   45000
    TASK/EPA CODE :Q625F-1-03   / R804650-02  (GRANT)  PRIOR  FY76 / $   411501
   PROJECT OFFICER : N L  RICHARDS
   INVESTIGATORS :    D G HUMM                       UNIV. OF NORTH CAROLINA
   MILE: 05/78 -REPORT ON SCREENING METHOD
         12/78 -FINAL REPORT ON VALIDATED BIOASSAY METHOD
         12/79 -FINAL REPORT ON METHOD AND MECHANISM
     WE HAVE DEVELOPED AND ARE CONTINUING THE TESTING OF A QUICK, SENSITIVE
     METHOD OF DETECTION OF WATER-BORN CARCINOGENS USING LABORATORY REARED
     FISH, AS A PART OF AN OVERALL SCREENING SYSTEM FOR CARCINOGENS. WE HOPE
     TO EXTEND THE TECHNIQUE TO A TISSUE CULTURE SYSTEM. EARLY APPLICATIONS ARE
      ALSO PLANNED TO INCLUDE THE EXAMINATION OF THE KINETICS OF
     TRANSMISSION OF CARCINOGENS ALONG NATURALLY OCCURRING FOOD CHAINS.
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PREPARE IDENTIFICATION MANUAL FOR THE ROTIFERS

    START/ COMPL DATE :    04/77 - 09/78 : FUNDING : EST. - FY   77  / $   12500
     TASK/EPA CODE :A612A-12      / R804652-01  (GRANT)  PRIOR  FY   /          1
    PROJECT OFFICER : C I  WEBER
    INVESTIGATORS :    J E GANNON                       UNIV. OF MICHIGAN
    MILE: 09/78 -COMPLETE IDENTIFICATION MANUAL FOR THE ROTIFERS
      OBJECTIVE: TO DEVELOP AN IDENTIFICATION MANUAL FOR THE COMMON SPECIES OF
      ROTIFERS IN THE UNITED STATES. APPROACH: THE GRANTEE WILL USE PERSONAL
       KNOWLEDGE OF ROTIFER IDENTIFICATION AND CONSOLIDATE PUBLISHED INFORMATION
      ON THE TAXONOMY AND ECOLOGY OF THE ROTIFERS TO PREPARE A KEY FOR THEIR
      IDENTIFICATION AND SUMMARIZE DATA ON THEIR ENVIRONMENTAL REQUIREMENTS
       AND POLLUTION TOLERANCE. OUTPUT: AN AGENCY REPORT CONTAINING A KEY
     TO THE IDENTIFICATION OF THE ROTIFERS AND SUMMARY DATA ON THEIR
     ENVIRONMENTAL REQUIREMENTS AND POLLUTION TOLERANCE.
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804661

II-238

(1) Objectives are to (a) develop a "framework" for the systematic analysis in the socioeconomic context of policies to control hazardous wastes, (b) to make a generalized analysis of the majority of existing and potential policies for hazardous waste control, and to array these policies so that the different impacts and trade-offs between alternative policies are demonstrated.

(2) Approach will be to identify the "parties-at-interest" and the nature of the impacts to which they are subjected, together with their possible responses. This will lead to generalized policy analysis using benefit/cost analysis techniques for quantifiable elements. Impacts of each policy-waste combination will be compared. The approach will be demonstrated by the use of one or two case studies in which the analysis is pursued in greater detail.

WATER-QUALITY HYDROLOGY OF SURFACE-MINED WATERSHEDS

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START/ COMPL DATE :    09/76 - 09/78 : FUNDING : EST. - FY   77  / $   39000
 TASK/EPA CODE :B623B-419     / R804673-02  (GRANT)  PRIOR  FY76 / $  390001
PROJECT OFFICER : R C  WILMOTH
INVESTIGATORS :    D B MCWHORTER                       COLORADO STATE UNIVERSITY
                   G V SKOGERBOE                       COLORADO STATE UNIVERSITY
MILE: 09/76 -FUNDING PACKAGE SUBMITTED
      10/76 -AWARD FUNDS FOR PROJECT
      10/77 -CONTINUATION
      09/78 -FINAL REPORT RECEIVED
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THE OBJECTIVE OF THE PROJECT IS TO DEVELOP A MANUAL OF PROCEDURES FOR QUANTITATIVELY ASSESSING THE IMPACT OF INDIVIDUAL SURFACE MINING PROJECTS ON THE WATER RESOURES IN THE AFFECTED WATERSHED. ONE APPROACH IS TO GATHER ALL PERTINENT DATA THAT IS AVAILABLE AND DETERMINE THE REQUIRED PARAMETERS BY FITTING THE MODEL TO THE DATA. THE SECOND APPROACH IS TO USE A WATERSHED MODEL TO GENERATE "FIELD" DATA FOR A WIDE VARIETY OF HYPOTHETICAL SITUATIONS AND DETERMINE THE REQUIRED PARAMETERS FOR THE SIMPLER MODEL. A CORRELATION BETWEEN THE PARAMETERS AND CONDITIONS SIMULATED BY THE WATERSHED MODEL WILL BE MADE. THE CORE OF THE MANUAL WILL BE A WATER-QUALITY HYDROLOGY MODEL DEVELOPED IN A PREVIOUS PROJECT. THIS MODEL HAS BEEN TESTED SUCCESSFULLY ON FOUR WATERSHEDS PREVIOUSLY, AND WILL BE FURTHER TESTED USING DATA NOW BEING COLLECTED AT MANY LOCATIONS IN THE ROCKY MOUNTAIN REGION. DETAILED PROCEDURES FOR TRANSLATING BASIC WATERSHED OBSERVATIONS INTO THE APPROPRIATE MODEL PARAMETERS WILL BE GIVEN.

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ENVIRONMENTAL MONITORING & ASSESSMENT OF COAL STRIP MINING & RECLAMATION
 IN THE FOUR CORNER AREA
   START/ COMPL DATE :    09/76 - 10/79 : FUNDING : EST. - FY   77  / $  145000
    TASK/EPA CODE :B623B-418    / R804679-02  (GRANT)  PRIOR  FY76 / $  1960001
   PROJECT OFFICER : J F  MARTIN
   INVESTIGATORS :    M M FOGEL                          UNIV. OF ARIZONA
                      J L THAMES                         UNIV. OF ARIZONA
                      T R VERMA                          UNIV. OF ARIZONA
                      L H HEKMAN                         UNIV. OF ARIZONA
                      L   DUCKSTEIN                      UNIV. OF ARIZONA
   MILE: 08/77 -FUNDING PACKAGE SUBMITTED
         09/77 -AWARD FUNDED
         09/78 -AWARD CONTINUATION
         10/79 -FINAL REPORT RECEIVED
     THE OVERALL OBJECTIVE OF THE PROJECT IS TO DEVELOP CRITERIA FOR THE OPT
     IMAL MANAGEMENT OF LAND THAT HAS BEEN DISTRIBUTED BY COAL STRIP MINING ACT
     IVITIES. THE CRITERIA WILL BE BASED ON MINIMIZING AIR AND WATER POLLUTION.
     SPECIFICALLY, THE SECOND PHASE OF THE PROJECT WILL BE DEVOTED PRINCIPALLY
     TO MONITORING (1) TWO SELECTED GROUNDWATER BASINS, (2) THREE SURFACE
     WATER SITES AND (3) THREE AIR QUALITY SITES TO DETERMINE THE EFFECTS OF
     STRIP MINING ON THE ENVIRONMENT. SEVERAL HOLES WILL BE DRILLED, CASED
     AND MONITORED FOR EACH OF THE SHALLOW GROUNDWATER BASINS. INFILTRATION ST
     UDIES WILL BE USED TO ASCERTAIN THE MOBILITY OF POLLUTANTS FROM THE LAND S
     URFACE TO GROUNDWATER. THE SURFACE WATER SITES WILL INVOLVE BOTH MINED AND
      UNDISTURBED AREAS AS WELL AS REVEGETATED AREAS WHICH ARE EITHER
     IRRIGATED OR RAINFED. HIGH VOLUME AIR SAMPLERS WILL BE USED TO MONITOR
     PARTICULATE CONCENTRATIONS BEFORE, DURING AND AFTER MINING DEVELOPMENT.
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II-241

YERSINIA ENTEROCOLITICA - RESERVOIRS AND IMPORT IN HUMAN DISEASE

START/ COMPL DATE : 00/76 - 00/79 : FUNDING : EST, - FY 77 / $ 31000
TASK/EPA CODE :D607A-044 / R804681 (GRANT) PRIOR FY76 / $ 290001
PROJECT OFFICER : V J CABELLI
INVESTIGATORS : M J PICKETT UNIV, OF CALIFORNIA
S M HARVEY CALIF, STATE UNIV, & COLLEGES
MILE: 06/78 -DEVELOPMENT AND EVALUATION OF ENUMERATION METHOD
09/79 -ECOLOGY OF PATHOGEN IN RELATION TO POLLUTION SOURCES

OUR OBJECTIVES ARE THREEFOLD: (1) REFINEMENT OF A NEW DIFFERENTIAL MEDIUM TO PROVIDE A SENSITIVE METHOD FOR DETECTION AND QUANTIFICATION OF YERSINIA ENTEROCOLITIC (2) ELUCIDATION OF THE ECOLOGY OF Y, ENTEROCOLITICA, AND (3) CLARIFICATION OF THE RELATIONSHIP BETWEEN THE WATER STRAINS OF Y, ENTEROCOLITICA AND THE STRAINS OF ANIMAL AND HUMAN ORIGIN, TOWARD THE ACHIEVEMENT OF THESE OBJECTIVES, WE HAVE DEVELOPED A DIFFERENTIAL MEDIUM FOR Y, ENTEROCOLITICA EMPLOYING MANGANOUS SULFATE AND UREA AS THE INDICATOR SYSTEM, WE ARE PRESENTLY TESTING THE EFFICACY OF THIS MEDIUM WITH VARIOUS SELECTIVE AGENTS WHEN USING MEMBRANE FILTRATION ISOLATION PROCEDURES, AFTER EXTENSIVE LABORATORY TESTING OF OUR METHOD, WE WILL DO A FIELD STUDY TO QUANTIFY Y, ENTEROCOLITICA IN WATER AS WELL AS IN OTHER ENVIRONMENTAL SOURCES, TO DATE, USING NON-QUANTITATIVE METHODS, WE HAVE ISOLATED 62 STRAINS OF Y, ENTEROCOLITICA FROM WATER PLUS 2 STRAINS FROM FECAL SWABS OF SQUIRRELS AND 3 STRAINS FROM RODENT BURROWS, OVER THE PAST YEAR, WE HAVE SUBJECTED OUR ISOLATES AND STRAINS COLLECTED FROM OTHERS (A TOTAL OF 200 STRAINS) TO 300 TESTS, THE DATA GENERATED BY THESE TESTS WILL BE STATISTICALLY ANALYZED AND RELATIONSHIPS BETWEEN THE ORGANISMS GRAPHICALLY DEPICTED USING NUMERICAL TAXONOMY METHODS, THESE RELATIONSHIPS WILL BE FURTHER CONFIRMED BY DNA HYBRIDIZATION AND BACTERIOPHAGE TYPING,

II-242

AN INVESTIGATION OF THE ECOLOGICAL EFFECTS OF RESIDUAL OZONE TO SELECTED ESTUARINE SPECIES

START/ COMPL DATE : 08/76 - 08/78 : FUNDING : EST, - FY 77 / $ 50000
TASK/EPA CODE :9625A-1-08 / R804683-02 (GRANT) PRIOR FY76 / $ 800001
PROJECT OFFICER : W P DAVIS
INVESTIGATORS : D T BURTON PHILA, ACAD, OF NAT, SCIENCES
MILE: 08/78 -FINAL REPORT

A COOPERATIVE EFFORT IS PROPOSED BETWEEN THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA AND THE UNIVERSITY OF MARYLAND TO STUDY THE ECOLOGICAL EFFECT OF RESIDUAL OZONE TO SELECTED ESTUARINE SPECIES, WE PROPOSE TO DETERMINE THE TOXICITY OF RESIDUAL OZONE, BOTH LETHAL AND SUBLETHAL EFFECTS, TO SELECTED COMMERCIALLY AND/OR RECREATIONALLY IMPORTANT ESTUARINE FINFISH AND SHELLFISH SPECIES AND THEIR LIFE STAGES UNDER VARIOUS ENVIRONMENTAL CONDITIONS, WE WILL ALSO COMPARE THE TOXICOLOGICAL EFFECTS OF RESIDUAL OZONE TO THOSE OF RESIDUAL CHLORINE WHICH ARE BEING DETERMINED ON THE SAME SPECIES AND LIFE STAGES UNDER THE SAME EXPERIMENTAL REGIMES SET FORTH ABOVE, FINALLY, WE PROPOSE TO EVALUATE THE ENVIRONMENTAL ACCEPTABILITY OF OZONE AS AN ALTERNATIVE TO CHLORINE,

II-243

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PREDICTING ORGANIC CONTAMINANT REMOVAL BY CLAY MINERALS AND WASTE
MATERIALS
   START/ COMPL DATE :    07/76 - 06/78 : FUNDING : EST. - FY   77  / $   75359
    TASK/EPA CODE :C618A-7036   / R804684 01  (GRANT)  PRIOR  FY76 / $   604951
  PROJECT OFFICER : R A  CARNES
  INVESTIGATORS :    R A GRIFFIN                        UNIV. OF ILLINOIS
                     R A GRIFFIN                        U.S. DEPT. OF THE INTERIOR
                     E S CHIAN                          UNIV. OF ILLINOIS
                     R A CARNES                         UNIV. OF ILLINOIS
  MILE: 10/78 -FINAL REPORT
    THE PURPOSE OF THE PROPOSED RESEARCH IS TO MEASURE THE CAPACITY OF SEL
    ECTED CLAY MINERALS AND WASTE COAL CHARS TO ADSORB HAZARDOUS ORGANIC COMPO
    UNDS FROM PURE AQUEOUS SOLUTIONS OF THE COMPOUNDS AND FROM MANUFACTURING W
    ASTES THAT CONTAIN THE COMPOUNDS. THE ADSORPTION WILL BE MEASURED AS A FUN
    CTION OF PH, CONCENTRATION OF ADSORBATE AND ADSORBENT, AND TIME. THE ADSOR
    PTION OF FAMILIES OF COMPOUNDS WILL BE MEASURED TO SYSTEMATICALLY DETERMIN
    E THE MECHANISMS RESPONSIBLE FOR ADSORPTION. TO AID IN A SYSTEMATIC EVALUA
    TION OF MECHANISMS RESPONSIBLE FOR ATTENUATION, A COMPREHENSIVE CRITICAL R
    EVIEW OF LITERATURE WILL BE UNDERTAKEN. THE VARIOUS ADSORBENTS TESTED WILL
     BE EVALUATED AS TO THEIR POTENTIAL USEFULNESS AS LINERS FOR
    LANDFILLS ACCEPTING HAZARDOUS ORGANIC-BEARING WASTES. THE RESULTS OF
    THIS STUDY SHOULD ALLOW PREDICTIVE MODELS TO BE DEVELOPED THAT WILL AID RE
    SEARCHERS AND REGULATORY AGENCIES IN PREDICTION OF ADSORPTION BEHAVIOR AND
    THE RELATIVE POLLUTION HAZARDS OF UNTESTED COMPOUNDS WITH SIMILAR
    STRUCTURES.
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II-244

ACCUMULATION AND FATE OF POTENTIALLY HAZARDOUS SUBSTANCES IN RECENT
SEDIMENTS OF LAKE HURON AND SAGINAW BAY
START/ COMPL DATE :   01/76 - 07/78 : FUNDING : EST. - FY 77 / $ 60198
TASK/EPA CODE :N608A-014 / R804686-02 (GRANT) PRIOR FY76 / $ 500001
PROJECT OFFICER : M D MULLIN
INVESTIGATORS : J A ROBBINS UNIV. OF MICHIGAN
K A JOHANSEN UNIV. OF MICHIGAN
J R KREZOSKI UNIV. OF MICHIGAN
K REMMERT UNIV. OF MICHIGAN
MILE: 10/78 -FINAL REPORT DUE

THE AIM OF THIS STUDY IS TWOFOLD: (1) TO OBTAIN PRESENT AND HISTORICAL RATES OF ACCUMULATION OF METALS AND NUTRIENTS IN THE FINE-GRAINED SEDIMENTS OF LAKE HURON AND (2) TO EVALUATE THE ROLE OF RESUSPENSION AND SEDIMENT-WATER EXCHANGE PROCESSES IN THE REGULATION OF WATER QUALITY. TO ACCOMPLISH THE FIRST OBJECTIVE, NULTIPLE UNDISTURBED 50 CM LONG CORES COLLECTED OVER A WIDE AREA OF THE LAKE HAVE BEEN SECTIONED ABOARD SHIP VIA HYDRAULIC EXTRUSION WHICH PERMITS PRECISE CM THICK SECTIONING OF FLUID SEDIMENTS NEAR THE SEDIMENT-WATER INTERFACE. CORE SECTIONS, FROZEN FOR PRESERVATION, ARE SUBSEQUENTLY FREEZE DRIED AND ACID EXTRACTS ANALYZED FOR NA, MG, CA, K, MN, FE, ZN, CU, NI, PB, CR, P AND CD VIA ATOMIC ABSORPTION SPECTROPHOTOMETRY. IN ADDITION, SELECTED SUBSAMPLES OF WHOLE DRY SEDIMENT ARE ANALYZED VIA NEUTRON ACTIVATION ANALYSIS FOR AL, CA, FE, K, MG, NM, FE, NA, TI, AS, BA, BR, CE, CO, CR, CS, CU, EU, HF, LA, LU, RB, SB, SC, SM, TH, U, V, AND YB. SEDIMENTATION RATES ARE DETERMINED PRIMARILY FROM VERTICAL PROFILES OF LEAD-210 WITH FALLOUT CESIUM-137 PROVIDING SUPPLEMENTARY INFORMATION. CONCENTRATION DATA IN COMBINATION WITH SEDIMENTATION RATES GIVE ESTIMATES OF THE NET FLUX OF ELEMENTS TO SEDIMENTS. TO ACCOMPLISH THE SECOND OBJECTIVE WE WILL INTENSIVELY STUDY SEASONAL VARIATIONS IN SEDIMENT-WATER EXCHANGE AT ONE OR TWO MARKED LOCATION IN SAGINAW BAY. RESUSPENSION EFFECTS AND PARTICLE SINKING RATES WILL BE DETERMINED FROM STANDARD AND AUTOMATED MICROTRAPS. LONG TERM RESUSPENSION EFFECTS WILL BE ESTIMATED FROM RESURVEY OF CESIUM-137 FINE-GRAINED DEPOSITS IN THE BAY. DIVER-COLLECTED CORES WILL BE SECTIONED AND SAMPLED FOR PORE WATER UNDER CONDITIONS APPROXIMATING THE IN SITU ENVIRONMENT AND DIRECT FLUX MEASUREMENTS ON RECOVERED CORES WILL COMPLEMENT PORE WATER STUDIES. THE ROLE OF BENTHIC FAUNA ON SEDIMENT-WATER EXCHANGE WILL BE INVESTIGATED BOTH IN THE FIELD AND IN THE LABORATORY. MULTIPLE RADIOTRACER METHODS WILL BE USED TO DETERMINE THE EFFECT OF SELECTED BENTHOS ON THEIR SEDIMENTARY ENVIRONMENT.

FOOD WEBS, POPULATIONS, AND PRODUCTIVITY IN A SOUTHEAST COASTAL MARINE MARSH

START/ COMPL DATE : 09/76 - 08/78 : FUNDING : EST. - FY 77 / $ 50000
TASK/EPA CODE :Q625A-1-07 / RP04688-02 (GRANT) PRIOR FY76 / $ 700001
PROJECT OFFICER : W P DAVIS
INVESTIGATORS : N A CHAMBERLAIN COLL. OF CHARLESTON
C K BIERNBAUM COLL. OF CHARLESTON
MILE: 08/78 -FINAL REPORT

THE OBJECTIVE OF THIS STUDY IS TO ESTABLISH LIFE HISTORY AND ECOLOGICAL INFORMATION ABOUT SALT MARSH COMMUNITIES IN THE NORTH EDISTO ESTUARY, LEADENWAH MARSH. THIS SITE WAS CHOSEN BECAUSE OF ITS ISOLATION FROM EXCESSIVE INFLUENCE OF HUMAN ACTIVITIES. ADDITIONALLY THE SITE IS ADJACENT TO THE E.P.A. BEARS BLUFF FIELD STATION. THERE, STUDIES ON EFFECTS OF LOW LEVELS OF HALOGENATED POLLUTANTS UPON MIXED COMMUNITIES OF MARSH ORGANISMS ARE BEING DONE. STUDIES OF THE LIFE HISTORIES OF ORGANISMS ON THE OYSTER BEDS, MUD, AND MARSH GRASS HABITATS WILL SUPPLY VALUABLE BASELINE DATA ABOUT BREEDING CYCLES, ONTOGENY AND TROPHIC RELATIONSHIPS, THEREBY PROVIDING INSIGHT FOR THE ECOSYSTEM MODELS RUN AT AT BEARS BLUFF.

THE BASIC STUDY PLAN COMBINES EXPERTISE IN MYCOLOGY, PLANT PHYSIOLOGY, PARASITOLOGY, GENETICS, INVERTEBRATE AND VERTEBRATE ZOOLOGY, AND ECOLOGY.THE SECOND YEAR OF THE STUDY WILL FOCUS MORE CLOSELY ON STUDIES ON PRODUCTIVITY AND TROPHIC RELATIONSHIPS AMONG THE MARSH ORGANISMS. UNDER CONSIDERATION (AMONG OTHER STUDIES) ARE HABITAT SELECTION AND TROPHIC RELATIONSHIPS OF: AMPHIPODS, FISHES, AND FISH LARVAE IN THE UPPER MARSH; INTERTIDAL AND SUBTIDAL BENTHIC CRUSTACEA; AND FISHES OF THE LARGER CREE

II-246

COMPARATIVE KINETIC STUDIES OF NUTRIENT UPTAKE AND GROWTH IN THE GREAT LAKES PHYTOPLANKTONS

START/ COMPL DATE : 08/76 - 07/79 : FUNDING : EST. - FY 77 / $ 75000
TASK/EPA CODE :N608A-028 / R804689-02 (GRANT) PRIOR FY76 / $ 500001
PROJECT OFFICER : V J BIERMAN
INVESTIGATORS : G RHEE STATE DIV. OF LABS. & RESEARC
MILE: 06/77 -MANUSCRIPT ACCEPTED FOR PUBLICATION IN LIMNOLOGY & OCEANOGRAPHY
06/77 -CHAPTER PREPARED FOR ADVANCES IN AQUATIC MICROBIOLOGY

IN FRESHWATER ENVIRONMENTS, LIMITING NUTRIENT FOR BIOLOGICAL PRODUCTION IS FREQUENTLY P FOLLOWED BY N. RECENT STUDIES OF NUTRIENT -LIMITED GROWTH IN PHYTOPLANKTON REVEALED THAT GROWTH RATE IS REGULATED BY INTRACELLULAR NUTRIENT POOL(S). IN CASE OF P, CELLULAR INORGANIC POLYPHOSPHATE (PPI) IS THE GROWTH REGULATING POOL IN SCENEDESMUS SP. AND THIS POOL ALSO APPEARS TO AFFECT P UPTAKE ALONG WITH EXTERNAL P LEVELS. FOR N, SUCH A RESERVE COMPOUND HAS NOT BEEN INVESTIGATED. THEREFORE, IT WILL BE INVESTIGATED WHETHER THE INVOLVEMENT OF PPI IN P-LIMITED GROWTH AND P UPTAKE IS UNIVERSAL IN ORGANISMS BELONGING TO VARIOUS TAXONOMIC GROUPS AND WHETHER THERE EXISTS N POOL(S) SIMILAR TO PPI FOR N-LIMITED GROWTH AND N UPTAKE. ATTEMPTS WILL BE MADE TO DEVELOP KINETIC MODELS FOR GROWTH AND N AND P UPTAKE INVOLVING NUTRIENT POOLS. THE TRANSITION BETWEEN N AND P LIMITATION IS AN IMPORTANT ASPECT IN POLLUTED ENVIRONMENTS. GROWTH DURING THIS TRANSITION IS DESCRIBED BY A SIMPLE THRESHOLD EQUATION OF NUTRIENT-LIMITED GROWTH. THIS IMPLIES THAT DIFFERING OPTIMAL N/P RATIO IN COMPETING SPECIES MAY BE A BASIS FOR COMPETITIVE EXCLUSION AND COEXISTENCE. THEREFORE, THE VARIABILITY OF THE RATIO IN VARIOUS SPECIES WILL BE STUDIED. IN ADDITION TO THE ABOVE PROBLEMS, THE EFFECT OF THE MAJOR ENVIRONMENTAL VARIABLES, TEMPERATURE AND LIGHT, ON GROWTH AND NUTRIENT UPTAKE WILL BE INVESTIGATED. EMPHASIS WILL BE PLACED ON THE PHYTOPLANKTERS OF THE GREAT LAKES AND EXPERIMENTAL STUDIES WILL INVOLVE THE EXAMINATION OF KINETICS IN CONTINUOUS CULTURE.

II-247

HAZARDOUS WASTE SAMPLING, ANALYSIS, AND COMPATIBILITY STUDY

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START/ COMPL DATE :    09/76 - 09/78 : FUNDING : EST. - FY   77  / $  261000
 TASK/EPA CODE :C618A-7037   / R804692-01  (GRANT)  PRIOR  FY76 / $   772001
PROJECT OFFICER : R A  CARNES
INVESTIGATORS :   R D STEPHENS                        STATE DEPT. OF HEALTH
                  D L STORM                           STATE DEPT. OF HEALTH
                  R A CARNES                          U.S. ENVIRON. PROTECTION AGCY
MILE: 06/77 -HAZARDOUS WASTE COMPATIBILITY OVERVIEW
      12/79 -USER MANUALS PUBLISHED
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THE OVERALL OBJECTIVES OF THIS RESEARCH PROGRAM ARE TO INVESTIGATE PROCEDURES FOR SAMPLING, CLASSIFYING, ANALYZING, AND HANDLING HAZARDOUS WASTES. A SERIES OF PROCEDURAL FIELD MANUALS WILL RESULT FROM THIS PROGRAM THAT WILL BE PRIMARILY DIRECTED TO PERSONS WHO ARE RESPONSIBLE FOR SAMPLING, HANDLING, AND DISPOSING OF HAZARDOUS WASTES. THE INFORMATION AND KNOWLEDGE GENERATED BY THIS PROGRAM PROVIDE VITALLY NEEDED GUIDELINES FOR HAZARDOUS WASTE HANDLERS AND ESTABLISH BASE-LINE DATA FOR THE DEVELOPMENT AND REFINEMENT OF FUTURE STATE AND FEDERAL HAZARDOUS WASTE MANAGEMENT REGULATIONS.

HIGH VELOCITY FABRIC FILTRATION

START/ COMPL DATE : 08/76 - 08/79 : FUNDING : EST. - FY 77 / $ 41119
TASK/EPA CODE :F624A-062 / R804700-02 (GRANT) PRIOR FY76 / $ 630311
PROJECT OFFICER : J H TURNER
INVESTIGATORS : M W FIRST HARVARD UNIVERSITY
D LEITH HARVARD UNIVERSITY
MILE: 08/76 -GRANT AWARDED
09/77 -YEARLY REPORT
09/78 -YEARLY REPORT
09/79 -FINAL REPORT

IF FABRIC FILTERS CAN BE MADE TO OPERATE AT HIGHER THAN CONVENTIONAL VELOCITY, A PROPORTIONAL REDUCTION IN FILTER SIZE AND INITIAL COST WILL BE POSSIBLE, MAKING THESE EFFICIENT COLLECTORS ATTRACTIVE FOR MANY APPLICATIONS WHERE THEY ARE NOT CURRENTLY USED. FOR EXAMPLE, A HIGH VELOCITY FILTER OPERATING AT A SUPERFICIAL FILTRATION VELOCITY OF 25 CM/S (AIR TO CLOTH RATIO OF 50 CFM/FT2) NEED BE ONLY 10 TO 25 PER CENT AS LARGE AS A UNIT OPERATING AT CONVENTIONAL VELOCITIES. THE OBJECTIVES OF THIS PROJECT ARE: (1) TO STUDY THE PRACTICALITY OF HIGH VELOCITY FABRIC FILTRATION, (2) TO INVESTIGATE PHENOMENA WHICH LIMIT EFFECTIVE HIGH VELOCITY OPERATION, AND (3) TO DEVELOP MATHEMATICAL MODELS TO INTERPRET AND PREDICT FABRIC FILTER PERFORMANCE. THESE OBJECTIVES WILL BE MET USING EXPERIMENTAL WORK WITH A THREE BAG PILOT SCALE FILTER CLEANED BY THE PULSE-JET PRINCIPLE, AND THEORETICAL WORK TO DESCRIBE FILTER PERFORMANCE MATHEMATICALLY.

804708

II-249

Project will improve lake water by diverting storm water to ponding areas then onto marsh areas which would serve as nutrient filters.

II-250

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WATER QUALITY EFFECTS RELATED TO BLENDING WATERS OF DIFFERENT ORIGIN IN
DISTRIBUTION SYSTEMS
   START/ COMPL DATE :    10/76 - 04/78 : FUNDING : EST. - FY   77  / $   59000
    TASK/EPA CODE :C614 -7178   / R804709-02  (GRANT)  PRIOR  FY76 / $   443501
   PROJECT OFFICER : R C  THURMAN
   INVESTIGATORS :    W K SCHIMPFF
                      H E PEARSON                   METROP. WATER DIST. OF CALIF.
                                                    METROP. WATER DIST. OF CALIF.
   MILE: 08/76 -PACKAGE PROCESSED
         09/76 -GRANT AWARD
         09/77 -INTERIM REPORT
         09/77 -CONTINUATION FUNDING PACKAGE PROCESSED
         10/78 -FINAL REPORT PUBLISHED
    OBJECTIVES: 1. TO EVALUATE THE EFFECTS OF BLENDING TWO OR MORE WATERS OF
    DIFFERENT ORIGIN AND INORGANIC CHEMICAL CONTENT IN PUBLIC WATER
    SYSTEMS AS RELATED TO CONSUMER ACCEPTANCE AND CONSUMER COSTS DIRECTLY ATTR
    IBUTABLE TO WATER QUALITY. 2. TO QUANTIFY CORROSION RATES AND CALCIUM CARB
    ONATE DEPOSITION TENDENCY IN DYNAMIC WATER SYSTEMS BEFORE AND AFTER BLENDI
    NG IN ORDER TO DEVELOP CONTROL MEASURES TO MINIMIZE DETERIORATION OF WATER
     SYSTEM FACILITIES AND HOUSEHOLD PLUMBING. APPROACH: DATA WILL BE GA
    THERED ON EIGHTEEN WATER QUALITY PARAMETERS TO MEASURE CHANGES IN CHEMICAL
     COMPOSITION RELATED TO CORROSION AND STABILITY, DISSOLUTION OF M
    ETALS FROM WATER SYSTEM FACILITIES AND HOUSEHOLD PLUMBING, AND DETERIORATI
    ON IN QUALITY WITH RESPECT TO TURBIDITY, COLOR, AND ESTHETIC ACCEPTABILITY
     AT THE CONSUMER TAP. CURRENT PLANS: THE EPA MOBILE WATER QUALITY RESEARCH
    LABORATORY WILL BE DEPLOYED AT SELECTED SITES WITHIN THE SERVICE AREA OF
     THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA WHERE IMPORTED
    WATERS FROM THE COLORADO RIVER AND CALIFORNIA AQUEDUCTS ARE BLENDED
    WITHIN ITS DISTRIBUTION SYSTEM OR MIXED WITH LOCAL GROUNDWATER SOURCES OF
    ITS MEMBER AGENCIES. CHEMICAL AND PHYSICAL TESTING WILL BE PERFORMED
     CONTINUOUSLY FOR PERIODS OF 48 HOURS OR LONGER WITH AN ON-BOARD C
    OMPUTER TO TAKE AND STORE DATA WHICH WILL BE TRANSFERRED TO MWD'S COMPUTER
    CENTER FOR STATISTICAL ANALYSIS AND XY (CONCENTRATION VS. TIME) PLOTTING.
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II-250.a

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DEVELOP AND EVALUATE A SOLID DEVICE FOR THE COMPLETE COLLECTION OF
ATMOSPHERIC POLY-CHLOROBIPHENYLS (PCB)
   START/ COMPL DATE :     03/77 - 05/80 : FUNDING : EST. - FY   77  / $   45000
    TASK/EPA CODE :G712B-BE-01   / R804716-02  (GRANT)  PRIOR  FY76 / $   410001
   PROJECT OFFICER : -     MEEKER
   INVESTIGATORS :    T F BIDLEMAN                     UNIV. OF SOUTH CAROLINA
   MILE: 12/80 -FINAL REPORT
     A SOLID STATE SAMPLING DEVICE IS TO BE DEVELOPED. IT SHOULD BE SMALL, EASY
      TO HANDLE, STABLE BOTH BEFORE AND AFTER COLLECTION, QUANTITATIVELY
     COLLECT PCBS, AND BE INEXPENSIVE AND STRONG.
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804717

II-251

Objectives: To devise and evaluate control methods for the imported fire ant utilizing chemical, physical, and biological control techniques and to develop accessory information required to support control methods.

Approach: Field and laboratory experiments will be utilized to study a combination of physical, chemical, biological, preventive, and homeowner controls. Basic biology studies will be concentrated in the area of food transfer, mound development, and foraging areas.

Progress: A complete literature search was conducted in late 1976 with field and laboratory studies being initiated in 1977. All phases of the investigation are currently active.

VEGETATIVE STABILIZATION OF SPENT OIL SHALE

START/ COMPL DATE : 08/76 - 08/79 : FUNDING : EST. - FY 77 / $ 10000
TASK/EPA CODE :1B6238-358 / R804719-01 (GRANT) PRIOR FY76 / $ 210001
PROJECT OFFICER : E HARRIS
INVESTIGATORS : W A BERG COLORADO STATE UNIVERSITY
MILE: 08/76 -FUNDING PACKAGE SUBMITTED
09/76 -AWARD FUNDS FOR PROJECT
09/77 -AMENDMENT
00/00 -FINAL REPORT RECEIVED

OBJECTIVE: TO INVESTIGATE SURFACE STABILITY AND SALT MOVEMENT IN SPENT OIL SHALES AND SOIL-COVERED SPENT SHALES AFTER A COVER OF NATIVE VEGETATION HAS BEEN ESTABLISHED BY INTENSIVE TREATMENTS AND THEN LEFT UNDER NATURAL PRECIPITATION CONDITIONS. APPROACH: THE STUDY IS BEING CARRIED OUT ON TWO DIFFERENT SPENT OIL SHALES. "SOIL" TREATMENTS ARE PLANT ESTABLISHMENT ON: 1. DIRECTLY ON LEACHED AND FERTILIZED SPENT SHALES; 2. SIX INCHES OF SOIL OVER LEACHED SPENT SHALE; 3. ONE FOOT OF SOIL OVER UNLEACHED SPENT SHALE; 4. SOIL. PLOTS HAVE BEEN ESTABLISHED ON 25 PERCENT NORTH AND SOUTH SLOPES AT ALTITUDES OF 5,700 AND 7,200 FEET IN OR NEAR THE PICEANCE BASIN OF NORTHWESTERN COLORADO. EACH PLOT (28 PER SITE) IS BORDERED WITH WOOD TO FORM INDIVIDUAL RUNOFF PLOTS 11 FEET WIDE AND 22 FEET LONG. SEDIMENT AND RUNOFF CATCHMENTS HAVE YET TO BE INSTALLED. ONE SITE (5,700') HAS BEEN INSTRUMENTED FOR SOIL SALINITY AND SOIL MOISTURE MEASUREMENTS. A COVER OF NATIVE PLANT SPECIES HAS BEEN ESTABLISHED ON THE LOWER ALTITUDE SITE AND WILL BE ESTABLISHED ON THE HIGHER SITE. MEASUREMENTS ON VEGETATION INCLUDE FREQUENCY, DENSITY AND VEGETATIVE GROUND COVER.

Monthly and semi-monthly physical, chemical and biological parameters will be determined at two-meter intervals from the surface to the bottom of the deepest position of the lake. With this information, a determination will be made of the concentration of aluminum sulfate needed to precipitate the available phosphorus in the lake. The aluminum sulfate applications will be made soon after the ice melts in the spring and again at the height of the water stratification in early fall.

II-258

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POWDERED CARBON-ACTIVATED SLUDGE - FILTRATION PROCESSES FOR PETROLEUM
REFINERY WASTEWATER
   START/ COMPL DATE :    01/77 - 12/79 : FUNDING : EST. - FY   77  / $  211350
    TASK/EPA CODE :L610C-18      / R804731-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : F M  PFEFFER
   INVESTIGATORS :    A T KNECHT                      ATLANTIC RICHFIELD COMPANY
   MILE: 07/77 -PRELIMINARY TESTING
         07/78 -BENCH TESTING
         10/78 -FULL-SCALE DESIGN
         10/79 -FULL-SCALE TESTING
         12/79 -FINAL REPORT
    OBJECTIVES: TO DETERMINE IF DIRECT ADDITION OF POWDERED ACTIVATED CARBON
    (PAC) TO ACTIVATED SLUDGE UNITS AND CHANGES IN OPERATING PROCEDURES WILL
    SIGNIFICANTLY IMPROVE EFFLUENT QUALITY AND APPROACH BEST AVAILABLE T
    ECHNOLOGY. THE ROLE OF ADSORBENTS IN ENHANCING BIOLOGICAL ACTIVITY WILL BE
     INVESTIGATED, ALONG WITH THEIR ULTIMATE IMPACT ON SLUDGE DISPOSAL BY
    LAND APPLICATION. PROGRAM: AN INVESTIGATION OF ACTIVATED SLUDGE TREATMENT
     OF REFINERY PROCESS WASTEWATERS WILL BE CONDUCTED IN LABORATORY BENCH
    -SCALE SYSTEMS. SIDE-BY-SIDE STUDIES WILL BE MADE TO: 1) DETERMINE ROLE OF
     ADSORBENTS IN ENHANCING BIOLOGICAL TREATMENT; AND 2) DETERMINE
    THE IMPACT OF LOADING VARIATIONS ON SYSTEM PERFORMANCE. ADDITIONAL STUDIES
    WILL BE CONDUCTED TO: 1) IDENTIFY HYDROCARBON TYPES WHICH RESIST REMOV
    AL BY BIOLOGICAL AND PHYSICAL TREATMENT PROGRAMS EVALUATED; 2) INVESTIGATE
    THE ULTIMATE FATE OF SLUDGES GENERATED BY TREATMENT PROGRAMS IN LAND
    APPLICATION TECHNIQUES; 3) FORMULATE A WORK PLAN FOR FULL-SCALE PLANT
    EVALUATION OF COMBINED ADSORBENT-ACTIVATED SLUDGE TREATMENT BASED ON PILOT
    STUDIES; AND 4) DEVELOP ROUGH ECONOMIC ASSESSMENT OF TREATMENT PROGRAMS
    INVESTIGATED.
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DETECTION, OCCURRENCE, CHARACTERIZATION, AND PERSISTENCE OF MICROBES IN LANDFILL LEACHATES

START/ COMPL DATE : 09/77 - 09/79 : FUNDING : EST. - FY 77 / $ 58000
TASK/EPA CODE :C618A-7038 / R804733 (GRANT) PRIOR FY / 1
PROJECT OFFICER : D R BRUNNER
INVESTIGATORS : P V SCARPINO UNIV. OF CINCINNATI
MILE: 09/79 -FINAL REPORT

OBJECTIVES: THE OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE HEALTH AND ENVIRONMENTAL SIGNIFICANCE OF THE PERSISTENCE OF FECAL STREPTOCOCCI FOUND IN LEACHATE FROM LANDFILL MUNICIPAL REFUSE. THE PROJECT WILL CONSIST OF TWO PHASES. APPROACH: THE INITIAL PHASE WILL VERIFY MICROBIAL ANALYTICAL METHODS AND DETERMINE THE PRESENCE OF STUDY ORGANISMS IN A VARIETY OF LEACHATES. SAMPLES OF LEACHATE FROM DIFFERENT SOURCES OF LANDFILLED WASTE REPRESENTING DIFFERENT STAGES OF WASTE DECOMPOSITION (AGE OF LANDFILL) AND DIFFERENT OPERATIONAL CONDITIONS (BATCH VERSUS CONTINUOUS DISPOSAL, CONTROLLED VERSUS NATURAL MOISTURE INFILTRATION) WILL BE ASSAYED FOR MICROBIAL AND CHEMICAL CONTENT. MICROBIAL ASSAYS WILL INCLUDE TOTAL AEROBIC AND ANAEROBIC PLATE COUNTS, INDICATORS OF FECAL POLLUTION, SELECTED BACTERIAL PATHOGENS (E.G., SALMONELLA, SHIGELLA, KLEBSIELLA, AND MYCOBACTERIA) AND ANAEROBES (E.G., CLOSTRIDIA) AND THE MAJOR FUNGI OF PATHOGENIC SIGNIFICANCE. CHEMICAL ANALYSES WILL BE USED TO DESCRIBE THE LEACHATE ENVIRONMENT. THE SECOND PHASE WILL STUDY THE RELATIONSHIP BETWEEN THE EXTENT OF WASTE DECOMPOSITION AND THE MICROBIAL POPULATION DYNAMICS. THREE EXPERIMENTAL LANDFILLS (SPECIALLY CONSTRUCTED 55-GAL. DRUMS) CONTAINING MUNICIPAL REFUSE, MUNICIPAL REFUSE AND SEWAGE SLUDGE, AND HOSPITAL WASTE WILL BE CONSTRUCTED AND OPERATED AT 16" OF NET INFILTRATION PER YEAR. LEACHATES WILL BE ASSAYED BI-WEEKLY INITIALLY AND LESS FREQUENTLY AS THE RATE OF POPULATION CHANGES DECREASES. OUTPUT: AN ASSESSMENT OF THE HEALTH SIGNIFICANCE OF THE CONTINUED LEACHING OF FECAL STREPTOCOCCI, AND DETERMINATION OF THE PRESENCE OF PATHOGENS IN A VARIETY OF LEACHATES WILL BE MADE IN THE FINAL REPORT.

II-260

EVALUATION OF THE ALGAL-MEANDER SYSTEM FOR ABATING POLLUTION FROM SECONDARY LEAD SMELTERS

START/ COMPL DATE : 08/77 - 09/78 : FUNDING : EST. - FY 77 / $ 10000
TASK/EPA CODE :B610C-172 / R804734-02 (GRANT) PRIOR FY76 / $ 260001
PROJECT OFFICER : D L WILSON
INVESTIGATORS : J C JENNETT SYRACUSE UNIVERSITY
J M HASSETT SYRACUSE UNIVERSITY
J SMITH SYRACUSE UNIVERSITY
MILE: 08/77 -FUNDING PACKAGE SUBMITTED
09/77 -AWARD FUNDS FOR PROJECT
06/78 -DRAFT FINAL REPORT
09/78 -FINAL REPORT RECEIVED

THE ALGAL-MEANDER SYSTEM UTILIZES SHALLOW STREAM ALGAL GROWTH TO TREAT LEAD-ZINC MINING AND MILLING WASTES. THE FIRST YEAR OF THE PROJECT HAS BEEN SPENT IN DEVELOPING VERY RAPID SCREENING TECHNIQUES TO DETERMINE WHICH ALGAL FORM REMOVE METALS AND UNDER WHAT PHYSICAL CONDITIONS. PRINCIPAL OBJECTIVES IN THE SECOND PHASE ARE A) TO SCALE UP ALGAL-MEANDER MODELS FROM MICROCULTURE TO LABORATORY PILOT PLANT; B) TO DETERMINE FEASIBILITY OF CONTINUOUS REMOVAL OF METAL AND ORGANOMETALLIC COMPOUNDS FROM WASTEWATER; C) TO DEVELOP KINETIC EQUATIONS FOR HEAVY METAL AND ORGANOMETALLIC REMOVAL BY ALGAE; AND D) TO EXAMINE THE FEASIBILITY OF REPLACING LIVING ALGAE IN THE MEANDER SYSTEMS WITH DRIED ALGAE, NATURAL PRODUCTS OR SYNTHETIC MATERIALS. THE APPROACH WILL BE TO USE CONTINUOUS FLOW LABORATORY MODELS WITH DEFINED ALGAL POPULATION AND FEEDSTOCK CONTAINING KNOWN CONCENTRATIONS OF HEAVY METALS AND/OR ORGANOMETALLICS. FROM ANALYSES OF THE EFFLUENTS, THE ADSORPTION KINETICS CAN BE CALCULATED AND DEVELOPED INTO DESIGN CRITERIA FOR FULL SIZE SYSTEMS. FACTORIAL COMBINATIONS OF METAL TYPE, ALGAL TYPE, TIME OF EXPOSURE, TEMPERATURE, PRESENCE OF ORGANIC POLLUTANTS, ETC., CAN BE EVALUATED. THIS INFORMATION CAN BE USED TO IMPROVE THE DESIGN OF ALGAL-MEANDER SYSTEMS, TO EXTEND THEIR USE FOR INDUSTRIAL WASTEWATER TREATMENT, AND TO ACHIEVE RECOVERY OF USEFUL MATERIALS FROM WASTE.

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RENEWAL OF WATER TEMPERATURE STUDIES AT THE USEPA MONTICELLO FIELD
STATION
    START/ COMPL DATE :     09/76 - 03/78 : FUNDING : EST, - FY   77  / $   13952
     TASK/EPA CODE :N608A-084    / R804736-01  (GRANT)  PRIOR  FY76 / $   427511
    PROJECT OFFICER : K E  HOKANSON
    INVESTIGATORS :    H   STEFAN                   UNIV, OF MINNESOTA
    MILE: 07/75 -INITIATE FIELD MEASUREMENTS
          04/77 -COMPLETED DEVELOPMENT OF PHYSICAL MODEL
          09/77 -COMPLETED ALL FIELD MEASUREMENTS FOR VERIFICATION
          03/78 -COMPLETE DRAFT FINAL REPORT
      THE MAIN OBJECTIVE OF THE STUDIES IS TO PROVIDE INFORMATION ON THE WATER
      TEMPERATURE REGIMES ENCOUNTERED IN EIGHT EXPERIMENTAL FIELD CHA
      NNELS IN WHICH BIOLOGICAL EXPERIMENTS ARE CONDUCTED, HEATED WATER IS DISCH
      ARGED THROUGH THESE CHANNELS AT LOW FLOW VELOCITIES, FIELD MEASUREMENTS OF
       WATER TEMPERATURES AND MATHEMATICAL MODELS ARE USED TO ACHIEVE THE
      OBJECTIVE, FIELD DATA ARE SUBJECTED TO STATISTICAL AND REGRESSION
      ANALYSIS TO GIVE INFORMATION ON LONGITUDINAL WATER TEMPERATURE G
      RADIENTS, DIURNAL WATER TEMPERATURE FLUCTUATIONS, VERTICAL STRATIFICATION,
       LONGITUDINAL DISPERSION, AND RATE OF SURFACE HEAT LOSS, CORRELATI
      ON WITH WEATHER PARAMETERS WILL BE PROVIDED, SOIL TEMPERATURE CONDITIONS A
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804745

II-261

Introduction: Previous studies of the effects of a jet fuel and #2 fuel oil spill into a major soft shell clam, *Mya, arenaria*, growing area at Long Cove, Searsport, Maine, reported an association between the spilled oil and cancerous tumors in many of the clams. The oil spill occurred in March 1971 and tumors have been found each year since then.

Objectives: The purpose of the proposed study is to determine whether or not there is a causal relationship between the spilled oil and the continuing development of tumors in the surviving clam population.

Approach: Combined studies involving the transplanting of soft shell clams of comparable size and age from a clean area to holding tanks in the Department of Marine Resources laboratory in Boothbay Harbor, Maine. Each tank will have an individual flow-through water system and the clams themselves will be placed in sediments from Long Cove at two different levels of residual petroleum hydrocarbon concentrations: 90-125 ppm and 230-300 ppm. Sediments from the clean control area will be transferred to the laboratory and laced with a known amount of the same oil fractions involved in the 1971 spill. Clams from the control area will be planted in these artificially contaminated sediments. Samples of sediments and of clams before and after exposure to the oiled sediments will be analyzed at the Chemistry Department of Bowdoin College. Clams exposed to clean sediments as well as to the various oil sediments will be examined in triplicate for tumors or other abnormalities: by the Histopathology Section of the EPA Laboratory, Narragansett, Rhode Island; the Smithsonian Institution; and the National Marine Fisheries Service Laboratory, Oxford, Maryland. Carbon flux studies will be conducted by the Bigelow Laboratory at Boothbay Harbor, Maine.

804749

Ocean-outfall disposal of domestic wastes raises pertinent questions concerning prior treatment and preferred outfall location due to a paucity of factual information and data. To resolve these questions, the research in this project is subsumed under three objectives which are to: (1) characterize the plume mixing zone as it relates to the kinds and subsequent dilution of sewage derived solutes, (2) test methods for the sampling and enumeration of viral pathogens and determine the most appropriate treatment procedure, and (3) evaluate outfall-induced (via particulates and pathogens) responses of sessile invertebrates and other important marine animals. Three outfalls in Dade, Broward and Palm Beach counties are designated for comparative sampling; data and samples evaluated by EPA, Corvallis. The project emphasizes laboratory work to evaluate the acute effects of sewage on marine animals and involves cooperation with other ongoing research relating to outfalls as well as interaction with user groups. An array of 50-200 gallon experimental tanks with metered inputs of sewage and seawater will be utilized for the experimental work on fish and certain invertebrates. State-of-the-art scientific methods and quality-assurance techniques used during the two-year study ensure that objectives are met on schedule and that all results are scientifically supported. The results will be of use in evaluating the performance standards of ocean outfalls as a disposal method.

THE CONTINUOUS MONITORING OF PARTICULATE SULFUR COMPOUNDS BY FLAME PHOTOMETRY

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   START/ COMPL DATE :    10/76 - 10/78 : FUNDING : EST. - FY   77  / $   35000
    TASK/EPA CODE :G6018-CA-21  / R804750-02  (GRANT)  PRIOR  FY76 / $   300001
   PROJECT OFFICER : D J  REUTTER
   INVESTIGATORS :   J J HUNTZICKER
                     L   ISABELLE                    OREGON GRAD. CTR. STU. & RES.
   MILE: 07/77 -PROCURE COMPONENTS                   OREGON GRAD. CTR. STU. & RES.
         10/77 -ASSEMBLE INSTRUMENTS
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OBJECTIVE: TO MAKE A DETAILED STUDY OF THE USE OF A FLAME PHOTOMETRIC DE
TECTOR FOR THE CONTINUOUS, IN SITU MEASUREMENT OF TOTAL PARTICULATE SULFUR
AND FOR THE SELECTIVE MEASUREMENT OF INDIVIDUAL SULFUR COMPOUNDS. APP
ROACH: THE TECHNIQUE IS BASED ON COUPLING A "DIFFUSION TUBE" SCRUBBER TO A
VERY SENSITIVE FLAME PHOTOMETRIC DETECTOR. THE DIFFUSION TUBE SCR
UBBER SERVES TWO PURPOSES: FIRST, ALL GASEOUS SULFUR COMPOUNDS ARE REACTED
OUT TO PERMIT MEASUREMENT OF PARTICULATE SULFUR ONLY IN THE FLAME PHOT
OMETRIC DETECTOR. SECOND, BY HEATING THE AEROSOL UPSTREAM OF THE DIFFUSION
TUBE, INDIVIDUAL SULFUR COMPOUNDS CAN BE VAPORIZED OR DECOMPOSED TO G
ASES WHICH ARE SUBSEQUENTLY REMOVED BY THE DIFFUSION TUBE. THIS RESULTS IN
A DECREASE IN THE FLAME PHOTOMETER OUTPUT OVER A TEMPERATURE RANGE WHICH
IS SPECIFIC TO THE SULFUR COMPOUND BEING VAPORIZED OR DECOMPOSED. A DETECT
ION LIMIT OF APPROXIMATELY 2 UG/M3 SULFUR IS ACHIEVED BY ELECTRONIC SIGNAL
AVERAGING THE DETECTOR OUTPUT. CURRENT PLANS/PROGRESS: PRELIMINARY
STUDIES ON FLASH VOLATILIZATION AT SEVERAL SULFATE COMPOUNDS ARE NEARI
NG COMPLETION. IT IS EXPECTED THAT THESE STUDIES WILL SHOW THE FEASIBILITY
AT MEASURING VOLATILE SULFATE CONCENTRATIONS BY HEATING DROPLETS
QUICKLY WITH A PLATINUM WIRE AND MONITORING RESULTANT SO2 WITH AN FPD.
SEVERAL DIFFUSION SCRUBBERS HAVE BEEN FABRICATED AND ARE NOW BEING EVAL
UATED FOR THEIR ABILITY TO REMOVE SO2, H2S, CH3SH, AND CH3SSCH3. THE FINAL
ASPECT OF THIS WORK IS THE DESIGN, FABRICATION AND TESTING OF PROTOTYPE
MONITORS FOR BOTH TOTAL AND INDIVIDUAL PARTICULATE SULFUR
COMPOUNDS.

MICROWAVE SYSTEM TO PREVENT HAZARDOUS MATERIAL DIKE FAILURES

START/ COMPL DATE :   09/76 - 07/79 : FUNDING : EST, - FY   77 / $ 37000
TASK/EPA CODE :B610A-192   / R804763-01 (GRANT) PRIOR FY76 / $ 200001
PROJECT OFFICER : J E BRUGGER
INVESTIGATORS :   R M KOERNER   DREXEL UNIVERSITY
                   A E LORD   DREXEL UNIVERSITY
MILE: 07/76 -FUNDING PACKAGE SUBMITTED
09/76 -AWARD FUNDS FOR PROJECT
09/77 -DECISION POINT, FUNDING INCREMENT
09/78 -FUNDING INCREMENT
07/79 -COMPLETE PROJECT
07/79 -FINAL REPORT RECEIVED

THE DETECTION AND LOCATION OF WATER LEVELS, WATER POCKETS, VOIDS AND VARIOUS OTHER DISCONTINUITIES BETWEEN DIFFERENT LAYERS OF EARTH OR ROCK IS CRITICAL IN INSURING THE PERFORMANCE AND SAFETY OF EARTH DAMS, SUCH UNDERGROUND ANOMALIES ARE PARTICULARLY UNDESIRABLE IN THE EARTH DAMS AND DIKES THAT CONTAIN HAZARDOUS MATERIALS SINCE THESE RELATIVELY SMALL EMBANKMENTS ARE GENERALLY NOT ENGINEERED OR CONSTRUCTED IN A RIGOROUS AND PROFESSIONAL MANNER, ONE POSSIBLE TECHNIQUE FOR DETECTING AND MONITORING SUCH FAULTS AND WEAK AREAS IS THE USE OF MICROWAVES, BY BEAMING CONTINUOUS OR PULSED MICROWAVES AT THE DIKE AND RECORDING THE RETURN SIGNAL AS IT IS REFLECTED FROM THE ANOMALY, THE LOCATION, TYPE AND DEPTH OF FAULTS CAN BE DETERMINED, A LITERATURE SEARCH (TECHNICAL, EQUIPMENT, LEGAL AND SAFETY) WILL BE UNDERTAKEN AND A NUMBER OF LABORATORY EXPERIMENTS WILL BE PERFORMED TO ASSESS THE PRACTICALITY OF USING MICROWAVES FOR THE NON-DESTRUCTIVE ASSESSMENT OF DIKE STABILITY, BASIC SOIL PROPERTIES SUCH AS DIELECTRIC CONSTANT, CONDUCTIVITY, ATTENUATION, PHASE SHIFT, AND VELOCITY WILL ALSO BE DETERMINED, THE FINAL RESULT OF THIS PROJECT WILL BE THE DETAILED SPECIFICATION FOR AN INEXPENSIVE, MOBILE, MICROWAVE UNIT (WITH KNOWN LIMITATIONS) TO DETERMINE UNDERGROUND WATER, IRREGULARITIES, AND DISCONTINUITIES IN SMALL EARTHEN DIKES,

II-265

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EVALUATION OF CANDIDATE INTERIM STANDARD LEACHING TEST

   START/ COMPL DATE :    06/77 - 09/77 : FUNDING : EST, - FY   77  / $   40000
    TASK/EPA CODE :C618A-7039    / R804773-010 (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : M    GRUENFELD
   INVESTIGATORS :   R    STANFORTH                       UNIV, OF WISCONSIN
                     R K  HAM                             UNIV, OF WISCONSIN
                     M    ANDERSON                        UNIV, OF WISCONSIN
   MILE: 10/77 -WORK COMPLETED - REPORT AVAILABLE
    THIS EXTENSION TO THE ORIGINAL GRANT R804773-010 IS DESIGNED TO ADD TO THE
     EXISTING PROJECT BY COMPARING THREE CANDIDATE LEACHING TESTS, IN
    CLUDING THE TEST EMERGING FROM THE BASE PROJECT, PLUS TWO ADDITIONAL TESTS
    TO BE SELECTED BY EPA. THESE COMPARISONS WILL BE MADE, USING AT LEAST TEN
     INDUSTRIAL WASTES TO BE SUPPLIED BY EPA TO THE PROJECT. THESE WASTES
    WILL REPRESENT A CROSS SECTION OF WASTES ANTICIPATED TO BE FOUND IN ACTUAL
     LEACHING TEST APPLICATIONS SO THAT THE DIFFERENT CANDIDATE TESTS
    CAN BE COMPARED USING AS WIDE A VARIETY OF WASTES AS POSSIBLE.
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THE FATE OF HUMAN VIRUSES IN GROUNDWATER RECHARGE SYSTEMS UTILIZING TERTIARY TREATED EFFLUENT

START/ COMPL DATE : 09/76 - 09/78 : FUNDING : EST. - FY 77 / $ 99500
TASK/EPA CODE :D607B-022 / R804776-02 (GRANT) PRIOR FY76 / $ 1000001
PROJECT OFFICER : E W AKIN
INVESTIGATORS : J M VAUGHN ASSOC. UNIVERSITIES INC.
MILE: 09/78 -FINAL REPORT

THE OBJECTIVE OF THE STUDY IS TO EVALUATE THE VIRUS AND BACTERIA-REMOVING CAPABILITIES OF A GROUNDWATER RECHARGE SYSTEM USING TERTIARY TREATED, CHLORINATED SEWAGE EFFLUENT IN ORDER TO DEFINE ITS ABILITY TO RETURN MICROBIOLOGICALLY ACCEPTABLE WATERS TO THE AQUIFER. OPERATIONS WILL INCLUDE: (A) ROUTINE WEEKLY ANALYSES OF SYSTEM INFLUENTS AND EFFLUENTS USING VIRUS CONCENTRATION METHODS FOLLOWED BY ENUMERATION AND IDENTIFICATION HUMAN VIRUS SP. (ENTEROVIRUSES), (B) STUDIES WITH KNOWN NUMBERS OF LABORATORY VIRUS STRAINS ADDED TO AND TRACED THROUGH THE SYSTEM, (C) STUDIES OF VIRUS SURVIVAL IN SOIL CORES TAKEN FROM RECHARGE SITE, (D) ROUTINE COLIFORM ANALYSES PERFORMED WITH SAME FREQUENCY AS ROUTINE VIRAL ANALYSES (A).

II-267

EFFECT OF LARGE SCALE AGRICULTURAL LAND DEVELOPMENT ON DRAINAGE WATERS

START/ COMPL DATE : 10/76 - 10/79 : FUNDING : EST. - FY 77 / $ 53000
TASK/EPA CODE :K617B-429 / R804778-02 (GRANT) PRIOR FY76 / $ 480001
PROJECT OFFICER : C N SMITH
INVESTIGATORS : R W SKAGGS UNIV. OF NORTH CAROLINA
J W GILLIAM UNIV. OF NORTH CAROLINA
MILE: 10/76 -START GRANT
10/79 -FINAL REPORT

THE OBJECTIVES ARE TO PROVIDE A DATA BASE AND ASSESSMENT METHODOLOGY TO ANALYZE AND MINIMIZE THE IMPACT OF "MEGA-FARMS" AS NONPOINT SOURCES OF NUTRIENTS, PESTICIDES, AND SEDIMENTS TO PRODUCTIVE COASTAL WATERS. THE OBJECTIVES ARE TO BE ACCOMPLISHED BY MONITORING DRAINAGE WATER QUANTITY AND QUALITY FROM THREE PAIRED FIELD SITES CONSISTING OF BOTH DEVELOPED AND UNDEVELOPED LAND ON THE FIRST COLONY (MEGA) FARM LOCATED ALONG THE EASTERN COAST OF NORTH CAROLINA. THE FARM IS LOCATED ON POORLY DRAINED SOILS IN THE HIGH-RAINFALL TIDEWATER PHYSIOGRAPHIC REGION. CHEMICAL ANALYSES ARE BEING CONDUCTED FOR PESTICIDES, PLANT NUTRIENTS, AND SEDIMENTS IN RUNOFF FROM MINERAL, SHALLOW ORGANIC, AND MUCK SOILS. HYDROLOGIC AND CHEMICAL TRANSPORT MODELS FOR PREDICTING NUTRIENT, PESTICIDE, AND SEDIMENT MOVEMENT FROM THE LAND AND THROUGH DRAINAGE NETWORKS AS WELL AS PEAK RUNOFF RATES AND TOTAL RUNOFF WILL BE EVALUATED FOR THE TIDEWATER CONDITIONS AND ASSESSMENT OF MEGA-FARM ENVIRONMENTAL IMPACT. MODELS TO BE TESTED INCLUDE EPA'S AGRICULTURAL RUNOFF MANAGEMENT MODEL (ARM) AND A DRAINAGE MODEL (DRAINMOD) DEVELOPED BY NCSU. A FINAL REPORT WILL BE PREPARED AT THE END OF THE PROJECT.

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INACTIVATION OF NATURALLY OCCURRING ENTEROVIRUSES

   START/ COMPL DATE :    10/76 - 10/78 : FUNDING : EST, - FY   77  / $   59129
    TASK/EPA CODE :C614A-7183   / R804780-02  (GRANT)  PRIOR  FY76 / $   602261
   PROJECT OFFICER : J C  HOFF
   INVESTIGATORS :    A R BEASLEY                      UNIV, OF MIAMI
                      G   ORTIZ                        UNIV, OF MIAMI
                      M M SIGEL                        UNIV, OF MIAMI
   MILE: 10/76 -PROJECT START
         08/77 -SEPARATION METHOD SELECTED
         06/77 -INTERIM REPORT PUBLISHED
         10/77 -INTERIM REPORT PUBLISHED
         08/77 -CONTINUATION FUNDING PACKAGE PROCESSED
         07/78 -PROJECT COMPLETED
         10/78 -FINAL REPORT PUBLISHED
    OUR ULTIMATE GOAL IS TO COMPARE NATURALLY SHED ENTEROVIRUSES (VACCINE
    STRAINS AND WILD VIRUSES) WITH THEIR TISSUE CULTURE GROWN COUNTERPARTS IN
    RESPECT TO THE KINETICS OF THEIR INACTIVATION BY CHLORINE, TO DO SO, H
    OWEVER, DEMANDS HIGH CONCENTRATIONS OF VIRUS IN A PURE STATE WITH LITTLE O
    R NO CHLORINE DEMAND, SINCE THE NATURALLY SHED VIRUS MUST BE OBTAINED FROM
     FECES, TECHNICS WHICH SEPARATE INORGANIC AND OTHER ORGANIC MATER
    FROM VIRUSES WITHOUT DEGRADATION OF VIRUS INFECTIVITY IN THE PROCESS ARE
    NECESSITATED, USING AS A MODEL NORMAL FECES ARTIFICALLY SEEDED WITH TISSUE
    CULTURE GROWN VACCINE STRAIN OF POLIOVIRUS TYPE 1, WE HAVE ACHIEVED
    CONSIDERABLE PURIFICATION AND CONCENTRATION BY A COMBINATION OF
    PROCEDURES, INCLUDING ULTRACENTRIFUGATION, SUCROSE GRADIENT
    CENTRIFUGATION AND PRECIPITATION OF VIRUS BY POLYETHYLENE GLYCOL 6000.
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II-269

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MODELING TRANSPORT AND BEHAVIOR OF PESTICIDES AND OTHER TOXIC ORGANIC
MATERIALS IN AQUATIC ENVIRONMENTS
   START/ COMPL DATE :    08/76 - 08/79 : FUNDING : EST. - FY   77  / $  130000
    TASK/EPA CODE :K609A-310    / R804820-02  (GRANT)  PRIOR  FY76 / $  1010001
   PROJECT OFFICER : R R  LASSITER
   INVESTIGATORS :    R A PARK                       RENSSELAER POLYTECHNIC INST.
   MILE: 08/79 -USER MANUAL ON EVALUATIVE MODEL FOR TOXIC ORGANICS
     A GENERALIZED MODEL REPRESENTING THE FUNCTIONAL CHARACTERISTICS OF TOXIC
     ORGANIC MATERIALS IN NATURAL AQUATIC ENVIRONMENTS IS BEING
     FORMULATED, IMPLEMENTED, AND TESTED. IT INCORPORATES PERTINENT PARTS OF TH
     E ECOSYSTEM MODEL CLEANER AND WILL HAVE POTENTIAL APPLICATION FOR STUDYING
      ENVIRONMENTAL IMPACTS OF PESTICIDES IN DIVERSE AQUATIC ECOSYSTEMS.
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II-270

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IRRIGATION AND GROUNDWATER MANAGEMENT FOR LAND DISPOSAL OF ANIMAL WASTES

   START/ COMPL DATE :    10/76 = 02/80 : FUNDING : EST, = FY   77  / $  119700
    TASK/EPA CODE :L617D=30     / R804827      (GRANT)  PRIOR  FY76 / $  3577131
   PROJECT OFFICER : R D  KREIS
   INVESTIGATORS :    W R WALKER                     COLORADO STATE UNIVERSITY
                      G V SKOGERBOE                  COLORADO STATE UNIVERSITY
                      W D KEMPER                     COLORADO STATE UNIVERSITY
                      R G EVANS                      COLORADO STATE UNIVERSITY
   MILE: 10/76 =FUND AND PROJECT CONSTRUCTION
        02/80 =FINAL REPORT TO PRINTERS
     THE PRINCIPAL OBJECTIVE OF THIS RESEARCH IS TO INVESTIGATE THE BEHAVIOR OF
      ANIMAL WASTES IN THE SOIL ENVIRONMENT OF IRRIGATED CROPLAND AND THE
     MOVEMENT OF SALTS, NUTRIENTS AND ORGANICS TO THE GROUNDWATER, THIS P
     ROJECT IS AN INVESTIGATION OF THE ROLE THAT IRRIGATION AND GROUNDWATER SYS
     TEMS AND THEIR MANAGEMENT HAVE ON LAND DISPOSAL OF ANIMAL WASTES, BOTH THE
      TECHNIQUES FOR MANAGING THE NITROGEN SYSTEMS AND PROTECTING RECEIVING
     WATERS FROM HIGH INPUT OF SALT AND NITRATE WOULD BE EXAMINED, THE P
     ROJECT IS DIRECTED TOWARD ESTABLISHING GUIDELINES FOR MANAGING THE SOIL=WA
     TER=PLANT RELATIONSHIPS IN ORDER TO MAXIMIZE THE EFFECTIVENESS OF THE SOIL
     AS A TREATMENT SYSTEM AND TO MINIMIZE THE MOVEMENT OF POLLUTANTS I
     NTO GROUNDWATERS WHILE AVOIDING DETRIMENTAL ACCUMULATIONS IN THE PLANT ROO
     T ZONE, PRIMARY EMPHASIS IS PLACED ON EVALUATION OF ALTERNATIVE IRRIGATION
      SYSTEM DESIGN AND MANAGEMENT PRACTICES WHICH LEND THEMSELVES TO
     IMPROVING IRRIGATED SOILS AS TREATMENT MEASURES FOR ANIMAL WASTES.
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A PROJECT TO DEVELOP AND EVALUATE AN ENVIRONMENTAL TECHNOLOGY TRANSFER
SYSTEM
   START/ COMPL DATE :    10/76 - 09/78 : FUNDING : EST. - FY   77  / $  125000
    TASK/EPA CODE :U622E-09      / R804847-02  (GRANT)  PRIOR  FY76 / $  1250001
   PROJECT OFFICER : J E  SMITH
   INVESTIGATORS :   R C FITE                           OKLA. ST. UNIV.
                     M   GREGORY                        OKLA. ST. UNIV.
   MILE: 08/77 -COMPLETED 2 SLIDE TAPES, TRAINED 5 FIELD OFFICERS, IMPACTED 2 M
         08/78 -COMPLETE 2 ADDITIONAL SLIDE TAPES, TRAIN ADDITIONAL OFFICERS AN
    OBJECTIVES: (1) IDENTIFY AND SELECT ENVIRONMENTAL PROBLEMS ABOUT WHICH
    LOCAL LEADERS NEED MORE TECHNICAL INFORMATION FOR WISE DECISION-MAKING.
     (2) FIND THE TECHNOLOGY AND ADAPT TO THEIR NEEDS, (3) DELIVER IT THRO
    UGH SELECTED OKLAHOMA COOPERATIVE EXTENSION FIELD AGENTS, (4) EVALUATE THE
     TECHNOLOGY TRANSFER EFFORT, (5) SHARE THE RESULTS OF THE STUDY,
    INCLUDING IMPLICATIONS FOR A NATIONAL TECHNOLOGY TRANSFER CAPABILITY.
    APPROACH: THE PROJECT IS CONDUCTED WITHIN THE STRUCTURAL FORMAT OF THE OKL
    AHOMA COOPERATIVE EXTENSION SERVICE, INCLUDING A "USER" ADVISORY COMMITTEE
     TO IDENTIFY PROBLEMS NEEDING ATTENTION. THE PROJECT STAFF DEVELOPS
    THE PACKAGES AND CONDUCTS THE EXPERIMENTAL COMPONENTS OF THE PROJECT.
     FIVE RURAL DEVELOPMENT AGENTS SPEND PART-TIME AS DISSEMINAT
    ORS. THEY WORK WITH THE PROJECT STAFF TO POLISH THE PACKAGED MATERIALS AND
    WITH THE COUNTY EXTENSION DIRECTORS TO ORGANIZE APPROPRIATE AUDIENCES.
     THEY MAKE THE PRESENTATIONS AND SOLICIT FEEDBACK FOR EVALUATION.
    PROGRESS AND FUTURE PLANS: THE RESULTS FROM TWO YEARS OF EXPERIME
    NTATION CONFIRM ALL HYPOTHESES. A NATIONAL EXTENSION VEHICLE IS NEEDED FOR
    A VARIETY OF NON-AGRICULTURAL INFORMATION. THE COOPERATIVE EXTENSION
    SERVICE CAN SATISFY MUCH OF THIS NEED IF AN ADEQUATE BUDGET IS PROVIDED.
    THE PROJECT WILL NOW EXPLORE THE USE OF OTHER EXTENSION AGENTS AS
    DISSEMINATORS. THE RESULTS OF THE STUDY WILL BE PUBLICIZED.
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804848

This set of studies represents a portion of a multi-institutional policy-oriented technology assessment of the socioeconomic and environmental impacts which might result from a proposed increased concentration of energy conversion facilities within the Ohio River Basin.

Utilizing the best available data bases, these studies will attempt to address the broad-scale environmental, institutional, economic and social effects of various future combinations of energy conversion facilities (e.g., coal-based plants producing synthetic fuels, as well as nuclear and coal-fired electric power generating plants) and their required support facilities (i.e., coal mining, processing and transportation; ash and sludge disposal facilities; nuclear fuel and reactor waste transportation facilites; and energy transportation systems, including electrical power transmission systems) that might be built and operated in this region in the future.

The principal objectives of this assessment are (1) to assist in outlining the full range of policy options for dealing with selected kinds of development, alternative levels of development and their possible undersirable effects, and alternative technological levels of environmental controls; and (2) to analyze the probable impacts that would result from implementing each option in its total framework, with special emphasis on the natural environment and its interrelationship with public health and welfare. The full range of primary, secondary, and higher order effects will be considered.

804850

Many local areas in the United States are faced with the problem of cost effective management of numerous small wastewater treatment plants. The Cypress Creek basin, near Houston, in North Harris County, Texas is an example of one of these areas. The objective of this project is to explore the optimum management system consistent with economic and effluent quality requirements through (1) a restructuring of current management and operations, (2) installation of moderate capital intensive modifications (minimum telemetry with inspection), (3) installation of maximum capital intensive modifications (maximum telemetry with minimum inspection), or a combination thereof. The approach to the problem will consist of a detailed analysis of existing data regardi (1) mechanical factors, causes of failures, frequency of failures, etc., (2) personnel factors, operation functions, skills, training, etc., (3) location factors, distances from central operations, special configurations, etc., (4) process factors, configuratio plant condition, effluent quality and quantity, etc., and (5) a cost analysis. Significant factors and relationships will determine system design. Implementation of the design will provide data for optimization.

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AN EVALUATION OF THE EMISSION OF NATURAL HYDROCARBONS FROM FOREST
VEGETATION BY MICROMETEOROLOGICAL METHODS
   START/ COMPL DATE :    07/76 - 06/77 : FUNDING : EST. - FY   77  / $   44000
    TASK/EPA CODE :G603A-AG-10  / R804860-01  (GRANT)  PRIOR  FY76 / $   200001
   PROJECT OFFICER : J J  BUFALINI
   INVESTIGATORS :   K R KNOERR                     DUKE UNIVERSITY
                     F L MOWRY                      DUKE UNIVERSITY
                     A C DUDGEON                    DUKE UNIVERSITY
   MILE: 12/78 -FINAL REPORT
     THE RESEARCH PROPOSED FOR THIS STUDY WOULD UTILIZE A MICROMETEOROLOGICAL
     APPROACH TO OBTAIN IMPROVED ESTIMATES OF THE TOTAL AMOUNT AND TIME COURSE
     OF THE NATURAL EMISSIONS OF HYDROCARBONS FROM THE FOREST VEGETATION.
     MICROMETEOROLOGICAL MEASUREMENTS, INCLUDING VERTICAL PROFILES OF VARIOUS
      HYDROCARBONS, WILL BE MADE IN A FORESTED AREA NEAR DURHAM, N.C. AT
     THE TRIANGLE SITE FOR THE INTERNATIONAL BIOLOGICAL PROGRAM (IBP) PR
     OJECT. THESE MEASUREMENTS WILL ENABLE US TO CALCULATE THE VERTICAL FLUX OF
     THESE HYDROCARBONS AND THUS THEIR EMISSION RATE FROM THE FOREST V
     EGETATION. THE PROPOSED RESEARCH WILL BE A COOPERATIVE EFFORT INVOLVING PE
     RSONNEL AND INSTRUMENTATION FROM BOTH THE IBP PROJECT AND THE GAS KINETICS
     PHOTOCHEMISTRY BRANCH (GKPB) OF THE EPA ENVIRONMENTAL SCIENCES RESEARCH L
     ABORATORY. THE MEASUREMENTS WILL BE MADE FOR SELECTED SAMPLING DAYS OVER A
     SIX MONTH PERIOD BEGINNING IN JULY, 1976. THEY WILL PROVIDE DAILY AND
     SEASONAL TIME COURSE ESTIMATES OF THE EMISSION OF NATURAL HYDROCARBONS W
     HICH CAN BE RELATED TO BOTH THE PHYSIOLOGICAL ACTIVITY AND WATER STATUS OF
      THE FOREST VEGETATION AND GENERAL CLIMATIC CONDITIONS. THEY WILL GIVE US
     A BETTER UNDERSTANDING OF THE IMPORTANCE OF VEGETATION IN THE
     PRODUCTION OF PHOTOCHEMICAL SMOG.
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II-274

AEROSOL FORMATION AND DEPOSITION IN A FOREST CANOPY

START/ COMPL DATE :   05/77 - 12/77 : FUNDING : EST. - FY   77 / $ 15000
 TASK/EPA CODE :G625B-EA-34 / R804860-0183(GRANT) PRIOR FY   /   1
PROJECT OFFICER : -   DURHAM
INVESTIGATORS :   K R KNOERR
                                   DUKE UNIVERSITY
MILE: 12/77 -FINAL REPORT

AN EXISTING GRANT (#804860, TASK AG-10) WITH DUKE U. WILL BE SUPPLEMENTED FOR CONTINUED OPERATION THOUGH FALL OF 1977. THIS GRANT WILL PROVIDE INFORMATION ON TURBULENT TRANSFER OF HEAT AND MOISTURE WHICH WILL BE USED WITH POLLUTANT PROFILES TO DETERMINE POLLUTANT EMISSION AND DEPOSITION RATES. GKPB WILL CONTINUE THEIR HC EMISSION STUDIES; ARB WILL PERFORM AEROSOL DEPOSITION STUDIES WITH THE PARTICIPATION OF HICKS (ANL) AND BROCK (U. OF TEXAS).

QUANTITATION OF THE DESORPTION & RECOVERY OF BACTERIA FROM SEDIMENT AND PARTICULATE MATTER IN THE OCEAN

START/ COMPL DATE : 10/76 - 10/79 : FUNDING : EST. - FY 77 / $ 36000
TASK/EPA CODE :D608 -01 / R804865-02 (GRANT) PRIOR FY76 / $ 300001
PROJECT OFFICER : A P DUFOUR
INVESTIGATORS : C D LITCHFIELD COLL. OF MED. & DENT. OF N.J.
M SCHERAGA COLL. OF MED. & DENT. OF N.J.
M HESKILL COLL. OF MED. & DENT. OF N.J.
MILE: 10/78 -COMPLETION

THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THE OBJECTIVE OF THIS STUDY IS TO PROVIDE A RELIABLE, REPRODUCABLE METHOD FOR RECOVERING VIABLE MICROORGANISMS FROM MARINE PARTICULATE MATTER. THE APPROACH HAS BEEN TO ESTABLISH A STANDARD ADSORPTION TECHNIQUE AND THEN TO TEST VARIOUS PHYSICAL AND CHEMICAL MEANS FOR QUANTITATIVELY REMOVING THE ADSORBED ORGANISMS FROM THE MODEL SYSTEM. BECAUSE OF THE DIFFERENT MECHANISMS OF ADSORPTION OR ATTACHEMENT SHOWN BY MOTILE AND NON-MOTILE BACTERIA BOTH TYPES ARE INCLUDED AS PURE CULTURE AND MIXED CULTURE WORK. DURING THE FIRST SEVEN MONTHS OF THE STUDY WE HAVE ESTABLISHED THAT ADSORPTION OCCURS RAPIDLY, IN LESS THAN 1 MINUTE. THIS RATE IS INDEPENDENT OF SEMIMENT TYPE: SLUDGE, SAND OR CLAY. ADSORPTION IS ALSO A RELATIVELY CONSISTENT PROPORTION OF THE BACTERIAL POPULATION: 20-29% REGARDLESS OF SEDIMENT TYPE. THERE WERE SLIGHT DIFFERENCES MOTED BETWEEN THE BACTERIAL STRAINS USED BUT THE OVERALL PICTURE APPEARED TO BE INDEPENDENT OF BACTERIAL GERMS. COMPARISONS WERE MADE BETWEEN SURFACE SPREAD PLATING OF THE TOTAL COLONY-FORMING UNITS (GFU) AND ATP ANALYSIS OF BOTH THE SUSPENDING MEDIUM AND THE SEDIMENTS. RECOVERY OF CFU INTO DILUTION BLANKS WAS LADE VIA STANDARD SINKING FOR 25 TIMES THROUGH A 90 DEGREES, 18 INCH ARC. ATP ANALYSIS AS CORTICAL PERFORMED IS INSUFFICIENTLY SENSITIVE FOR DETECTION OF THE SLIGHT CHANGES NECESSARY TO THIS STUDY. ATTEMPTS TO IMPROVE ATP TECHNIQUE ARE UNDERWAY AND INCLUDE CHANGES IN EXTRACTION AND BUFFER MEDIA. DIRECT COUNTS, VIA EPIFLUORESCENCE MICROSCOPY, WERE ALSO COMPARED AND GAVE GREATLY ELEVATED COUNTS AND GREATLY REDUCED ATP/CELL VALUES. PART OF THIS "ERROS" IS DUE TO PROBLEMS IN FIXATION OF THE CELLS AND THIS ASPECT IS CURRENTLY UNDER INVESTIGATION. EVALUATION OF PH, SONICATION, IONIC STRENGTH AND CHEMICAL TREATMENTS FOR IMPROVING THE RECOVERY OF THE MOCROBES FROM PARTICULATE MATTER WILL BE PURSUED. ALSO THE LIMULUS TEST AND FITC WILL BE COMPARED FOR THEIR SENSITIVITY IN ESTIMATING RECOVERED BIOMASS FROM SEDIMENTS AND PARTICULATE MATTER.

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IMPACT OF NUTRIENT & SEDIMENTS ON SURFACE WATERS IN THE U.S.

   START/ COMPL DATE :    09/76 - 09/78 : FUNDING : EST. - FY   77  / $  100035
    TASK/EPA CODE :K609A-309    / R804868-01  (GRANT)  PRIOR  FY76 / $  1000001
   PROJECT OFFICER : D L  BROCKWAY
   INVESTIGATORS :   F B GOLLEY                      UNIV. OF GEORGIA
   MILE: 10/78 -REPORT ON NATURE AND MAGNITUDE OF SEDIMENT AND NUTRIENT LOADING
     THE OBJECTIVE OF THIS STUDY IS TO ASSESS THE MAGNITUDE AND NATURE OF
     NUTRIENT AND SEDIMENTS ENTERING SURFACE WATERS OF THE UNITED STATES AND TO
     PREPARE A RESEARCH PLAN TO FILL GAPS IN THE STATE OF KNOWLEDGE OF THE
     MAGNITUDE AND NATURE OF NUTRIENTS AND SEDIMENTS ENTERING SURFACE WATERS. A
     STATE OF KNOWLEDGE REPORT WILL BE DEVELOPED BY TEAMS OF EXPERIENCED
     RESEARCH WORKERS AND APPLIED SCIENTISTS WHO WILL SURVEY THE AVAILABLE
     INFORMATION AND SUMMARIZE THESE DATA IN AN APPROPRIATE FORM.
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II-277

THE VIRUS CARRIAGE STATUS IN THE HARD-SHELL CLAM - THE PRECISION, SENSITIVITY AND ACCURACY OF METHODS FOR ITS DETECTION
START/ COMPL DATE : 10/77 - 10/78 : FUNDING : EST. - FY 77 / $ 31000
TASK/EPA CODE :D607A-024 / R80488201-2 (GRANT) PRIOR FY76 / $ 315941
PROJECT OFFICER : M A LEVIN
INVESTIGATORS : T G METCALF UNIV. OF NEW HAMPSHIRE

THE PURPOSE OF THE STUDY IS TO DETERMINE WHETHER AN ACCEPTABLE VIRUS RECOVERY METHOD SPECIFICALLY APPLICABLE TO THE HARD-SHELL CLAM EXISTS OR CAN BE DEVELOPED FOR USE IN EVALUATING THE VIRUS-ASSOCIATED HEALTH HAZARD IN MAN WHICH MIGHT RESULT FROM THE CONSUMPTION OF UNCOOKED OR STEAMED HARD-SHELL CLAMS HARVESTED FROM APPROVED WATERS. AN ACCEPTABLE RECOVERY METHOD WOULD HAVE A PROPOSED PRECISION OF PLUS OR MINUS 20 PERCENT, A SENSITIVITY OF 1-2 PFU PER 100 GRAMS, AND AN ACCURACY OF 70 PERCENT. INFORMATION WILL BE SOUGHT ON THE USEFULNESS OF AN ENTEROVIRUS INDICATOR FOR ASSESSING HEALTH HAZARDS ASSOCIATED WITH HARD-SHELL CLAMS OBTAINED FROM POLLUTED WATERS AND RETAIL MARKET SOURCES. THE STUDY WILL BE COORDINATED WITH A HEALTH EFFECTS RESEARCH LABORATORY PROGRAM CONCERNED WITH POTENTIAL PUBLIC HEALTH PROBLEMS OF BACTERIAL OR VIRAL ORIGIN IN MAN RESULTING FROM THE INGESTION OF HARD-SHELL CLAMS.

DIFFUSION CHAMBER ARRAY FOR AQUATIC ENVIRONMENTAL EXPOSURE

START/ COMPL DATE : 04/77 - 03/78 : FUNDING : EST. - FY 77 / $ 31000
TASK/EPA CODE :D608 -05 / R804886 (GRANT) PRIOR FY76 / $ 250001
PROJECT OFFICER : A P DUFOUR
INVESTIGATORS : J M SIEBURTH UNIV. OF RHODE ISLAND
MILE: 03/78 -COMPLETION

THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. OBJECTIVE: TO PROVIDE A TESTED AND WORKING PROTOTYPE OF A BUOYED DIFFUSION CHAMBER ARRAY FOR MULTI-DEPTH ENVIRONMENTAL EXPOSURE OF SEWAGE IN AQUATIC ENVIRONMENTS TO BE USED TO FOLLOW THE RATE OF DECAY OF FECAL INDICATORS AND PATHOGENS OF HUMAN ORIGIN. APPROACH: WELL-AGITATED NUCLEPORE MEMBRANES PERMIT THE FREE DIFFUSION OF SOLUTES THROUGH THE PORES WHILE BOTH RETAINING BACTERIA AND VIRUSES AND MINIMIZING THE NERNST LAYER, PLUGGING AND WALL GROWTH. THE USE OF THESE MEMBRANES IN A SUBMERSIBLE TRANSLUCENT CHAMBER ALLOWS THE TOTAL EFFECT OF IN-SITU TEMPERATURE, SUNLIGHT, INORGANIC AND ORGANIC SOLUTES TO BE OBSERVED ON THE TEST INDICATORS AND PATHOGENS. THE DEPLOYMENT OF DIFFUSION CHAMBERS AT THREE DEPTHS ALLOWS THE EFFECT OF THE CONDITIONS NEAR THE SURFACE, NEAR THE THERMOCLINE AND BELOW THE THERMOCLINE OR PHOTIC ZONE TO BE OBSERVED SIMULTANEOUSLY, AS THE BUOYED ARRAY DRIFTS WITH THE SEWAGE PLUME IN THE TEST AREA. A LIGHT-PROTECTED CLOSED LOOP OF TUBING WITH A MINIMAL VOLUME OF CONSTANTLY PUMPED LIQUID BETWEEN THE CELLS AND THE SURFACE BUOY PERMITS SAMPLING AT INTERVALS OF CHOICE FROM AN INFLATABLE VESSEL WITHOUT RAISING THE ARRAY. CURRENT PLANS: THE PROTOTYPE WILL BE TESTED AND REFINED IN RHODE ISLAND WATERS TO MEET THE SPECIFICATIONS OF THE EPA HEALTH EFFECTS LABORATORY AT WEST KINGSTON, R.I.

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PROTECTION OF ASBESTOS-CEMENT PIPE FROM CORROSION IN WATER DISTRIBUTION   .
SYSTEMS BY WATER TREATMENT
   START/ COMPL DATE :    11/76 - 10/78 : FUNDING : EST. - FY   76  / $   11160
    TASK/EPA CODE :C614A-7138   / R804888-02  (GRANT)  PRIOR  FY76 / $   306001
   PROJECT OFFICER : R W  BUELOW
   INVESTIGATORS :   C E GRUBB                          COMM. OF PUBLIC WORKS
                     W J ROLLINS                        COMM. OF PUBLIC WORKS
   MILE: 09/76 -GRANT AWARDED
         08/77 -TREATMENT STARTED
         08/78 -FINAL REPORT
     OBJECTIVE: TO COAT ASBESTOS-CEMENT PIPE USED IN POTABLE WATER SYSTEMS TO
     PREVENT ASBESTOS FIBERS FROM BEING ERODED INTO THE WATER. APPROACH: ALL
      WATER ENTERING THE DISTRIBUTION SYSTEM WILL BE TREATED WITH AN ANT
     I-CORROSION AGENT (ZINC-ORTHROPHOSPHATE). PROGRESS: MATERIALS AND SUPPLIES
     HAVE BEEN ORDERED. PROCESS SHOULD START BY MID-SUMMER.
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FULL AND PILOT SCALE EVALUATION AND OPTIMIZATION OF THE ANAEROBIC SLUDGE DIGESTION PROCESS

START/ COMPL DATE : 09/77 - 03/79 : FUNDING : EST. - FY 77 / $ 129261
TASK/EPA CODE :C611B-7066 / R804889-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : B V SALOTTO

INVESTIGATORS :		
	J H MOSER	KENOSHA WATER UTILITY
	J H MOSER	ENVIREX INCORPORATED
	D F NELSON	KENOSHA WATER UTILITY
	G G SELIN	KENOSHA WATER POLLUTION PLANT

MILE: 03/79 -FINAL REPORT

THE OVERALL OBJECTIVE OF THIS PROPOSED WORK IS TO OPTIMIZE OPERATIONAL PERFORMANCE AND SYSTEM COSTS OF ANAEROBIC TREATMENT SYSTEMS. THIS PROPOSAL DESCRIBES TWO APPROACHES WHICH OFFER POTENTIAL FOR OPTIMIZING SYSTEM DESIGN FOR DIGESTION OF MUNICIPAL SLUDGES. OPTIMIZATION OF THE DESIGN AND OPERATIONAL VARIABLES OF A SINGLE-STAGE HIGH-RATE DIGESTER WOULD LEAD TO THE MOST COST-EFFECTIVE DIGESTER DESIGN. OPTIMIZATION OF THE ANAEROBIC TREATMENT PROCESS TRAIN WOULD PROVIDE FOR THE MOST EFFECTIVE AND VIABLE ROUTE FOR DIGESTING SLUDGE SOLIDS, IN TERMS OF BOTH COSTS AND PERFORMANCE. MORE SPECIFICALLY, THE FOLLOWING AREAS WILL BE INVESTIGATED AT THE KENOSHA WATER POLLUTION CONTROL PLANT OVER AN EIGHTEEN-MONTH PERIOD: 1. FULL-SCALE OPTIMIZATION OF OPERATIONAL VARIABLES (SRT AND SO) IN HIGH-RATE DIGESTION. 2. PILOT-SCALE EVALUATION OF SINGLE-STAGE HIGH-RATE DIGESTION/CENTRIFUGATION. 3. PILOT-SCALE EVALUATION OF ANAEROBIC CONTACT PROCESS. 4. PILOT-SCALE EVALUATION OF TORPEY PROCESS.

II-281

LONG DISTANCE TRANSPORT OF AIR POLLUTANTS

START/ COMPL DATE : 09/77 - 09/78 : FUNDING : EST. - FY 77 / $ 53157
TASK/EPA CODE :G603A-AB-37 / R804891-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : K DEMERJIAN
INVESTIGATORS : J A FAY MASS. INST. OF TECHNOLOGY
MILE: 09/78 -FINAL REPORT

THIS RESEARCH IS CONCERNED WITH DEVELOPING AN ANALYTICAL TECHNIQUE FOR PREDICTING OR CORRELATING MEASUREMENTS OF AIR POLLUTANT LEVELS RESULTING FROM THE TRANSPORT OF POLLUTANTS OVER LONG DISTANCES (I.E., GREATER THAN 100 KILOMETERS). A HORIZONTAL DIFFUSION MODEL, USING DIFFUSIVITIES BASED UPON THE RANDOM HORIZONTAL CONVECTIVE MOTION OF THE WIND, IS USED TO DETERMINE LONG TIME AVERAGE POLLUTANT CONCENTRATIONS. THE MODEL INCLUDES EFFECTS OF TRANSFORMATION AND DEPLETION AS FIRST ORDER PROCESSES, AND CAN ACCOUNT FOR VERTICAL DIFFUSION WHERE NECESSARY. VARIOUS PARAMETRIC STUDIES OF SOX TRANSPORT AND DIFFUSION WILL BE CARRIED OUT AND COMPARED WITH AVAILABLE MONITORING DATA IN THE CONTINENTAL U.S.

804894

II-282

An aeration project is proposed in the lower portion of the approximately seven mile long 20 billion gallon Loch Raven Reservoir, a key element in the metropolitan Baltimore area water supply system.

Primary objectives are reservoir destratification by aeration, improvement of dissolved oxygen concentrations at lower depths during summer months with concommittant reduction in manganese levels, and a decrease in the number of blue-green algae and also possibly in the total algal count. If these objectives are met, major improvements will occur in raw water quality including elimination of taste and odor problems associated with blue-green algal blooms and reduction in chlorine necessary to mitigate the manganese problem in the fall.

The proposed system involves the feed of compressed air into perforated tubing on the reservoir bottom within a 0.6 mile distance above the dam. Resultant rising air bubbles will achieve destratification. Criteria to be met in the aerated zone are a uniform temperature depth profile (± 3°C) and a 2.0 mg/l minimum dissolved oxygen concentration at the reservoir bottom.

804896

II -283

Restorative measures involves watershed modifications and purchase of easements. The project specifically includes construction of flood control dams, sediment retention structures and diversion; seeding gulley shaping; and roadside erosion control (SCS).

II-284

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DETERMINATION OF GIARDIA CYST VIABILITY

    START/ COMPL DATE :    10/76 - 10/76 : FUNDING : EST. - FY   77  / $   41963
     TASK/EPA CODE :C614A-7186    / R804898-02  (GRANT)  PRIOR  FY76 / $   419831
    PROJECT OFFICER : J C  HOFF
    INVESTIGATORS :   E A MEYER                    OREGON STATE HIGHER EDUC: SYS
    MILE: 10/76 -PROJECT START
          08/77 -CONTINUATION FUNDING PACKAGE PROCESSED
          12/77 -ANNUAL REPORT
          09/78 -PROJECT COMPLETED
          12/78 -FINAL REPORT PUBLISHED
     OBJECTIVES: PRINCIPAL OBJECTIVE IS THE DEVELOPMENT OF A SENSITIVE,
     STANDARDIZED METHOD OF DETERMINING WHETHER OR NOT GIARDIA CYSTS ARE
     VIABLE. APPROACH/CURRENT PLANS: A. OBTAINING A SUPPLY OF GIARDIA CYSTS. AS
     YMPTOMATIC, GIARDIA-INFECTED HOSTS WILL BE IDENTIFIED AND USED AS A SOURCE
     OF CYSTS. HUMAN HOSTS (FROM THE UNIV. OF ORE. HEALTH SCIENCES CENTER) OR
      MONKEY HOSTS (OREGON REGIONAL PRIMATE CENTER) MAY BE USED; A SUPPLY OF
     DOGS IS ALSO AVAILABLE. B. PURIFICATION AND CONCENTRATION OF GIARDIA CYSTS
     FROM FECAL MATTER. SEVERAL METHODS WILL BE TESTED AND THE MOST SUITABLE
     ONE ADAPTED. THESE INCLUDE THE FILTRATION OF HOMOGENIZED FECAL
     SUSPENSION THROUGH GRADED (5, 10, 15 MICRON) NYLON SCREENS, AND THE USE OF
     SUCROSE DENSITY GRADIENTS. C. DETERMINATION OF CYST VIABILITY WILL BE APPR
     OACHED IN SEVERAL WAYS: (1) THE POSITIVE/NEGATIVE CULTURE METHOD, IN WHICH
     THE MINIMUM NUMBER OF CYSTS NEEDED TO ESTABLISH A CULTURE IS DETERMINED.
     (2) CYST INFECTIVITY: DEVELOPMENT OF A SUITABLE ANIMAL MODEL. NORMAL AS
     WELL AS IMMUNOSUPPRESSED ANIMALS WILL BE TESTED FOR THIS PURPOSE. PRE
     LIMINARY EXPERIMENTS SUGGEST THAT THE IMMUNOSUPPRESSED MOUSE IS CAPABLE OF
     SUPPORTING INFECTIONS OF GIARDIA RECOVERED FROM MAN. (3) QUANTITATED BIO
     LUMINESCENCE. THIS METHOD INVOLVES DETERMINING WHETHER ATP, PRESENT IN ALL
     LIVING CELLS, IS DEMONSTRABLE AND QUANTIFIABLE IN GIARDIA CYSTS.
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II-285

REMOVAL OF VIRUS FROM PUBLIC WATER SUPPLIES

START/ COMPL DATE : 10/76 - 10/78 : FUNDING : EST. - FY 77 / $ 20000
TASK/EPA CODE :D614B-026 / R804903-01 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : E W AKIN
INVESTIGATORS : J T OCONNOR UNIV. OF MISSOURI
L HEMPHILL UNIV. OF MISSOURI
[illegible] UNIV. OF MISSOURI
[illegible] UNIV. OF MISSOURI
MILE: 08/77 -CONTINUATION FUNDING PACKAGE PROCESSED
01/78 -COMPLETE PILOT PLANT CONSTRUCTION
09/78 -PROJECT COMPLETED
12/78 -FINAL REPORT PUBLISHED

THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO DETERMINE THE VIRUS REMOVAL OR DESTRUCTION CAPABILITY OF VARIOUS WATER TREATMENT PROCESSES. THE PROCESSES TO BE TESTED WILL INCLUDE CONVENTIONAL PHYSICAL AND CHEMICAL TREATMENT PROCESSES, AS WELL AS DISINFECTION. PARTICULAR EMPHASIS WILL BE PLACED ON THE VIRICIDAL PROPERTIES OF VARIOUS WATER DISINFECTANTS, INCLUDING CHLORINE, CHLORAMINE, CHLORINE DIOXIDE AND OZONE ON NATURALLY OCCURRING VIRUS. THE PROPOSED STUDY WILL BE CONDUCTED AT THE WATER TREATMENT PLANT IN LEXINGTON, MISSOURI, UTILIZING WATER FROM THE MISSOURI RIVER. THE OVERALL STUDY WILL CONSIST OF THREE PARTS. THE FIRST PART WILL BE A LONGITUDINAL STUDY OF AT LEAST ONE YEAR TO DETERMINE THE VIRAL CONTENT OF THE INFLUENT AND FINISHED WATER FROM THE LEXINGTON WATER TREATMENT PLANT. IN THE SECOND PART, AN ATTEMPT WILL BE MADE TO ASSESS THE CONTINUED EFFECTIVENESS OF WATER DISINFECTION PROCESSES UTILIZING MISSOURI RIVER WATER WHICH HAS BEEN PRESETTLED (UNDERGONE PLAIN SEDIMENTATION) OR SOFTENED BY THE ADDITION OF LIME. FINALLY, A PILOT PLANTS WILL BE CONSTRUCTED TO ASSESS THE EFFECT OF CONVENTIONAL WATER TREATMENT PROCESSES ON THE REMOVAL OF NATURALLY OCCURRING VIRUS. THE PILOT PLANT WILL BE A PORTABLE, 10 GPM TREATMENT UNIT PROVIDING FOR CHEMICAL ADDITION AND MIXING, COAGULATION, SEDIMENTATION AND FILTRATION. THE TREATMENT RESPONSES TO BE MEASURED WILL BE PRIMARILY VIROLOGICAL, BUT WILL INCLUDE OTHER CONVENTIONAL OR TENTATIVE MEASURES OF MICROBIOLOGICAL CONTAMINATION SUCH AS MPN, FECAL COLIFORM, TOTAL COLIFORM, ACID-FAST ORGANISMS AND YEAST. WHERE APPROPRIATE, ADDITIONAL SAMPLES WILL BE COLLECTED FOR ANALYSIS FOR THE FORMATION OF CHLORINATED ORGANIC COMPOUNDS.

Restoration techniques include removal of accumulated sludge and sediment, diversion of storm water, expansion of marshy areas in order to filter and dilute natureal run off, and stabilization of soil around the lake system to prevent erosion.

804908

Renovation consists of draining and dredging the pond, erosion control, pond inlet and outlet improvement and pond bottom repair.

804910

This application is for a Federal matching grant to assist North Marin County Water District to restore Stafford Lake", a 4400 acre foot municipal water supply reservoir constructed in 1950 to serve 45,000 people and also providing fishing and shoreline recreation benefits (golf course, park and picnic areas). Over the years the lake has been the receptical of nutrient laden silt which has accelerated the lake cycle to a eutrophic state. The nutrients stem chiefly from dairy wastes which are in the process of being controlled but the shallow areas created over the years and enriched bottom sediments requires removal to restore lake health. Yet an additional source of pollution is runoff from urban development encroaching on the east perimeter. One key buffer (land) purchase could stem this encroachment. Currently, part of the desired buffer land is also subjected to gross overgrazing which is resulting in rapid erosion which must be halted by erosion control work.

804917

II-289

The purpose of this project is to assess the environmental impact of wastewater contaminants originating from the production of synthetic fuels from coal, and to evaluate alternative wastewater treatment technologies for the control of these contaminants. The project is carried out in several phases over a 5-year period consisting of (a) a literature review and survey of pilot- and full-scale coal conversion facilities to identify specific contaminants which might be found in coal processing wastewaters, (b) a study of the biodegradability of selected organic constituents from such wastewaters including an assessment of the aquatic impact of these constituents and biodegradation products, (c) biological and physical-chemical treatability studies of selected organic constituents and identification of the residuals following treatment, (d) animal toxicology studies to evaluate the potential health effects of those wastewater components for which sufficient information is not available in the literature, (e) treatability studies of composite synthetic and real coal-processing waters including analytical characterization and aquatic impact assessment of the treated waters, and (f) development of design criteria for continuous treatment of wastewaters from coal-conversion facilities.

II-290

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DEVELOPMENT OF BIOASSAY PROCEDURES FOR DEFINING POLLUTION OF HARBOR
SEDIMENTS
   START/ COMPL DATE :    11/76 - 10/78 : FUNDING : EST. - FY   77  / $   69940
    TASK/EPA CODE :N608A-085    / R804918-01  (GRANT)  PRIOR  FY76 / $  1980911
   PROJECT OFFICER : R L  ANDERSON
   INVESTIGATORS :   D A BAHNICK                  UNIV. OF WISCONSIN
                     A L BUIKEMA                  VIRGINIA POLY. INST. & ST. U.
                     J   CAIRNS                   VIRGINIA POLY. INST. & ST. U.
                     C L RUTHERFORD               VIRGINIA POLY. INST. & ST. U.
                     W A SWENSON                  UNIV. OF WISCONSIN
  MILE: 09/78 -FINAL REPORT
    THIS PROJECT WILL MEASURE THE EFFECTIVENESS OF SEVERAL BIOASSAY PROCEDURES
     AND CHEMICAL TESTS FOR DEFINING QUALITY OF HARBOR SEDIMENTS SUBJECT TO
     REMOVAL BY DREDGING. RESULTS OF CHEMICAL TESTS FOR CONCENTRATION OF VOLA
    TILE SOLIDS, COD, TOTAL KJELDAHL NITROGEN, OIL AND GREASE, PCB'S, SELECTED
     PESTICIDES AND POLYNUCLEAR AROMATIC HYDROCARBONS IN HARBOR SEDIMENTS
    AND/OR THEIR INTERSTITIAL WATERS WILL BE DETERMINED AND RELATED TO
    THE FOLLOWING: 1. CONCENTRATION OF METALS AND ORGANIC POLLUTANTS IN
    CHIRONOMIDAE REMOVED FROM THE SEDIMENTS. 2. COUGH RESPONSE OF BLUEGILL
    SUNFISH IN BIOASSAYS USING SEDIMENT INTERSTITIAL WATERS. 3. SURVIVAL OF DA
    PHNIA SP. IN BIOASSAYS WITH SEDIMENT AND SURFICIAL WATERS. 4. BEHAVIOR AND
    SURVIVAL OF HEXAGENIA SP. IN HARBOR SEDIMENTS. 5. BIOACCUMULA
    TING POTENTIAL, AS DEFINED BY THE LIPID/WATER PARTITION COEFFICIENT OF ORG
    ANIC CHEMICALS IN INTERSTITIAL WATER WILL BE DEFINED FROM RELATIONSHIPS TO
    CONCENTRATION IN CHIRONOMIDAE. 6. ACTIVITY OF ENZYMES IN SEDIMENT IN
    TERSTITIAL WATERS, AND (7) BIOCONCENTRATION OF ORGANIC POLLUTANTS BY FISH.
    THE PROJECT WILL PROVIDE SEVERAL RELIABLE AND INEXPENSIVE SHORT-TERM TESTS
     FOR ACCURATELY DEFINING THE POLLUTION STATUS OF POTENTIAL HARBOUR DREDGE
     MATERIALS.
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II-291

A NUMERICAL STUDY OF HALOCARBON CHEMICAL REACTION ON STRATOSPHERIC &
TROPOSPHERIC OZONE & OTHER PHOTOCHEMICAL PROCESSES (ABBREV)
START/ COMPL DATE : 11/76 - 10/79 : FUNDING : EST. - FY 77 / $ 56000
TASK/EPA CODE :G603A-AI-06 / R804921 01 (GRANT) PRIOR FY76 / $ 340001
PROJECT OFFICER : P HANST
INVESTIGATORS : P J CRUTZEN COLORADO STATE UNIVERSITY
MILE: 06/79 -FINAL REPORT

A SYSTEMATIC DEVELOPMENT OF NUMERICAL MODELS CAPABLE OF EXAMINING THE EFFECTS OF HALOGENATED GASES ON STRATOSPHERIC PHOTOCHEMISTRY AND THE EARTH'S OZONE BALANCE WILL BE UNDERTAKEN. BECAUSE THE INDUSTRIAL HALOGENATED GASES HAVE THEIR ORIGIN AT THE SURFACE, THIS RESEARCH WILL ALSO BE CONCERNED WITH THE FATE OF THESE GASES IN THE TROPOSPHERE. TO ACCOMPLISH THIS GOAL, IT IS IMPORTANT TO SIMULATE ATMOSPHERIC PROCESSES AS REALISTICALLY AS POSSIBLE. THEREFORE, THE MODEL SHOULD BE DESIGNED SUCH THAT EXCHANGE MECHANISMS IN THE PLANETARY BOUNDARY LAYER, AS WELL AS BETWEEN THE TROPOSPHERE AND STRATOSPHERE, CAN BE PROPERLY SIMULATED. THE FIRST STEP OF THIS MODELING EFFORT WILL BE THE DESIGN AND EXAMINATION OF THE RESULTS OF A ONE-DIMENSIONAL, TIME-DEPENDENT MODEL. EVENTUALLY TWO- AND THREE-DIMENSIONAL MODELS INCORPORATING REALISTIC BOUNDARY CONDITIONS WILL BE DEVELOPED. USING THE BEST AVAILABLE CHEMICAL KINETIC DATA, A DETAILED EXAMINATION OF THE FORMATION OF INTERMEDIATE HALOGENATED GASES WHICH MAY OR MAY NOT BE REMOVED FROM THE TROPOSPHERE BY HETEROGENEOUS PROCESSES WILL BE CONDUCTED. TO OBTAIN A MEASURE OF THE EFFICIENCY OF THESE PROCESSES, THE NUMERICAL SIMULATIONS WILL BE COMPARED TO MEASUREMENTS OF THE VARIOUS HALOGENATED GASES IN THE ATMOSPHERE.

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PREPARATION OF A MUNICIPAL TECHNOLOGY BULLETIN AND INPUT TO THE WRSIC
DATA SERVICE
  START/ COMPL DATE :    10/77 - 10/78 : FUNDING : EST. - FY   77  / $   57219
   TASK/EPA CODE :U622E-08      / R804922-01  (GRANT)  PRIOR  FY76 / $   583021
  PROJECT OFFICER : D B  RISHER
  INVESTIGATORS :   H    MIIDO
                    J    KUTCHER                       FRANKLIN INST. OF STATE OF PA
                    L    ERDELYI                       FRANKLIN INST. OF STATE OF PA
                    R P  KRAMER                        FRANKLIN INST. OF STATE OF PA
                    I    TAKACS                        FRANKLIN INST. OF STATE OF PA
                    J    PINTO                         FRANKLIN INST. OF STATE OF PA
MILE: 12/76 -MUNICAPAL TECHNOLOGY BULLETIN, ISSUE #1, THE FIRST OF 12 MONTHL
      11/78 -FINAL REPORT
  UNDER THE PROVISIONS OF THIS GRANT, THE SCIENCE INFORMATION SERVICES
  DEPARTMENT OF THE FRANKLIN INSTITUTE RESEARCH LABORATORIES WILL DO THE FOL
  LOWING: BY CONTINUOUSLY SURVEYING THE UNITED STATES' AND FOREIGN TECHNICAL
   LITERATURE AND MAINTAINING CLOSE LIAISON WITH VARIOUS RESEARCH ORG
  ANIZATIONS IN AREAS OF MUNICIPAL WASTEWATER POLLUTION CONTROL, S.I.S. WILL
  EMPHASIZE THE FOLLOWING SUBJECT AREAS: URBAN RUNOFF AND SEWERS; TUNNEL
  TECHNOLOGY, PATENTS, TREATMENT METHODS, ANALYTICAL TECHNIQUES,
  HYDROLOGY, AND MODEL STUDIES. THIS LITERATURE WILL BE SCANNED ON A MONTHLY
  BASIS. PERTINENT MATERIAL WILL BE CHOSEN FOR INCLUSION IN THE MONTHLY
  TECHNOLOGY BULLETIN AND WATER RESOURCES SCIENTIFIC INFORMATION CENTER
   (WRSIC) DATA SERVICE. SELECTED LITERATURE WILL BE ABSTRACTED.
  THE BULLETIN WILL BE PREPARED AND DISTRIBUTED. INDEXES AND A JOURNAL LIST
  WILL BE PREPARED. CAMERA-READY COPY WILL BE PROVIDED TO PROJECT
  OFFICER. BULLETIN WILL BE MAILED TO DISTRIBUTION LIST PROVIDED BY THE
  PROJECT OFFICER.
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II-293

SIMS THREE YEAR STUDY ON STATISTICS AND ENVIRONMENTAL FACTORS IN HEALTH

START/ COMPL DATE : 10/76 - 10/79 : FUNDING : EST. - FY 77 / $ 100000
TASK/EPA CODE :H601C-7214 / R804932-02 (GRANT) PRIOR FY76 / $ 450001
PROJECT OFFICER : W C NELSON

INVESTIGATORS :	
D L THOMSEN	SOC. FOR INDUS. & AP. MATH.
J L FLEISS	COLUMBIA UNIVERSITY
I F GOLDSTEIN	COLUMBIA UNIVERSITY
J M CUZICK	COLUMBIA UNIVERSITY
H E ROBBINS	COLUMBIA UNIVERSITY
B SINGER	COLUMBIA UNIVERSITY
I OLKIN	STANFORD UNIVERSITY
P DIACONIS	STANFORD UNIVERSITY
R E FAITH	STANFORD UNIVERSITY
Y MITTAL	STANFORD UNIVERSITY
L E MOSES	STANFORD UNIVERSITY
T W SAGER	STANFORD UNIVERSITY

MILE: 07/77 -SIMS TECHNICAL PROGRESS REPORT
07/78 -SIMS TECHNICAL PROGRESS REPORT

SIMS. DURING 1976 SIMS WILL CONTINUE TO COORDINATE THE STUDY AS OUTLINED IN THE PROPOSAL (FEBRUARY 1976). THIS COORDINATION WILL IN PART CONSIST OF ENSURING COMMUNICATION BETWEN THE REVIEW PANEL AND THE CENTERS AT COLUMBIA AND STANFORD; IT WILL ALSO CONSIST OF [illegible]URING DIRECT COMMUNICATION BETWEEN THE TWO CENTERS IN THE FORM OF BOTH [illegible]NAL VISITATIONS BY MEMBERS OF THE STUDY AND SEMINARS AS APPROPRIATE. AS SOON AS ANY TECHNICAL REPORTS AND PAPERS ARE PRODUCED AS A RESULT OF THE STUDY, SIMS WILL SEE THAT THERE IS SUITABLE DISTRIBUTION. COLUMBIA: THE FIRST STEPS WILL BE TAKEN [illegible]DS THE CONSTRUCTION OF A DOUBLY STOCHASTIC POISSON PROCESS AS A MODE [illegible] MORTALITY AND MORBIDITY DATA IN WHICH THE RATE PARAMETER IS ITSELF A RANDOM VARIABLE DEPENDING ON TIME, WEATHER, AND POLLUTION. RESEARCH WILL BEGIN TO DEVELOP SOUNDER STATISTICAL METHODS THAN SO FAR EMPLOYED FOR DETECTING GEOGRAPHIC AREAS IN WHICH THERE IS NONRANDOM CLUSTERING OF CASES OF A CERTAIN DISORDER, WITH PROPER CONTROL FOR SUCH FACTORS AS SIZE OF POPULATION, PROXIMITY TO TREATMENT FACILITIES, AND UTILIZATION OF THOSE FACILITIES. PRINCIPAL COMPONENTS ANALYSIS FOR INDIVIDUAL POLLUTANTS WILL BEGIN OF CORRELATIONS, COVARIANCES, AND RAW CROSS-PRODUCTS BETWEEN READINGS FROM THE 40 MONITORING STATIONS IN THE NEW YORK CITY AEROMETRIC NETWORK. STANFORD: DURING THE FIRST YEAR, RESEARCH WILL INCLUDE THE FOLLOWING: THE EFFECTS OF TIME AVERAGING ON THE DISTRIBUTION OF POLLUTANT CONCENTRATION MAXIMA; THE RELEVANCE OF PROBABILISTIC ASSUMPTIONS TO THE ESTIMATION OF SPATIAL POLLUTANT DISTRIBUTIONS; THE RELATION BETWEEN SPATIAL AIR POLLUTION PATTERNS AND SPATIAL HEALTH AND MORTALITY STATISTICS; A RETROSPECTIVE LOOK AT THE EFFECTS OF THE 1974 FUEL CRISIS ON AIR POLLUTION AND MORTALITY STATISTICS.

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II-294

BEHAVIOR OF DDT AND KEPONE IN SEDIMENT=WATER SYSTEMS UNDER DIFFERENT
OXIDATION REDUCTION AND PH CONDITIONS
START/ COMPL DATE :   10/76 = 10/78 : FUNDING : EST. = FY   77 / $ 85416
TASK/EPA CODE :K609A=305   / R804940=01 (GRANT) PRIOR FY76 / $ 992001
PROJECT OFFICER : H W HOLM
INVESTIGATORS :   W H PATRICK   LOUISIANA STATE UNIV. SYSTEMS
MILE: 01/79 =REPORT TRANSFORMATION OF PESTICIDES IN WATER/SEDIMENT SYTEMS
THE RESULTS OF THIS STUDY SHOULD PROVIDE INFORMATION ON (1) CONDITIONS
AFFECTING THE MOVEMENT OF THESE PESTICIDES INTO ESTUARIES AND QUIET WATER
AREAS, (2) CONDITIONS GOVERNING MIGRATION OF THE PESTICIDES INTO THE
SEDIMENT AFTER REACHING A QUIET WATER AREA, AND (PROBABLY MOST IMPORTANT),
(3) THE EFFECT ON THE PHYSICO=CHEMICAL CONDITIONS LIKELY TO BE
ENCOUNTERED IN NATURE ON THE DEGRADATION OF THESE TWO BIOLOGICALLY ACTIVE
PESTICIDES.

II-295

CHAMBERS WORKS WASTEWATER TREATMENT PLANT - REMOVAL OF ORGANIC AND ORGANO-NITROGEN COMPOUNDS FROM WASTEWATER

START/ COMPL DATE : 11/76 - 11/79 : FUNDING : EST. - FY 77 / $ 100000
TASK/EPA CODE :L610B-19 / S804943-02 (GRANT) PRIOR FY76 / $ 870001
PROJECT OFFICER : J E MATTHEWS
INVESTIGATORS : H W HEATH E.I. DU PONT DE NEMOURS & CO.
MILE: 11/76 -BEGAN STARTUP OF PACT SYSTEM
03/77 -PACT SYSTEM ON LINE
09/77 -REPORT ON STARTUP OF PACT SYSTEM
11/79 -COMPLETE PROJECT-REPORT ON OPERATION OF PACT SYSTEM

THE OBJECTIVE OF THIS PROJECT IS TO OBTAIN ACTUAL OPERATING AND COST DATA FROM LARGE SCALE INDUSTRIAL APPLICATION OF "PACT" TECHNOLOGY. DATA WILL BE GATHERED FROM A WASTEWATER TREATMENT PLANT BEING CONSTRUCTED AT THE DU PONT CHAMBERS WORKS TO TREAT 26,000 GPM COLORED INDUSTRIAL WASTEWATER. NEUTRALIZED EFFLUENT FROM THE PRIMARY TREATMENT SECTION OF THE PLANT WILL BE CONTACTED WITH 100 TO 200 PPM POWDERED ACTIVATED CARBON AND FED TO THREE 4,000,000 GALLON AERATORS IN PARALLEL CONTAINING RECYCLED ACTIVATED SLUDGE. THE "PACT" COMBINED CARBON AND BIOLOGICAL TREATMENT WILL REMOVE OVER 90% OF THE WASTEWATER BOD AS WELL AS NON-BIODEGRADABLE, BUT CARBON ADSORBABLE ORGANICS. TOXIC SUBSTANCES AND COLOR WILL ALSO BE REDUCED. WASTEWATER QUALITY WILL BE SUFFICIENT TO PERMIT CHAMBERS WORKS TOTAL PLANT EFFLUENT TO MEET ALL EFFLUENT LIMITATIONS IN THE PLANT'S NPDES PERMIT. THIS CONTINUATION GRANT WILL COVER THE INITIAL YEAR'S EXPERIENCE WITH START-UP AND OPERATION OF THE WASTEWATER TREATMENT PLANT. PLANT CONSTRUCTION WAS GENERALLY COMPLETED BY NOVEMBER 1976 AND A LENGTHY START-UP PROCEDURE COMMENCED. IT IS EXPECTED THE PLANT WILL BE OPERATING AT FULL CAPACITY BY MAY, 1977.

II-296

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DILINEATION OF COASTAL MARSH BOUNDARIES IN CENTRAL ATLANTIC COASTAL
REGION
   START/ COMPL DATE !    10/76 = 01/78 ! FUNDING ! EST, = FY   77  / $    1800
    TASK/EPA CODE !M608C=011     / R804947=01  (GRANT)  PRIOR  FY76 / $   360001
  PROJECT OFFICER ! H V  KIBBY
  INVESTIGATORS !    J D BOON
  MILE! 02/78 =FINAL REPORT                        VIRGINIA INST, OF MARINE SCI,
     PROJECT WILL DEVELOP A SET OF VEGETATIVE CRITERIA AND RELATE THESE
     CRITERIA TO A TIDAL DATUM IN THE MID=ATLANTIC REGION,
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804948

II-291

A full cost/benefit analysis of the nuclear fuel reprocessing industry is proposed. The analysis will compare, over time, the costs of reprocessing and associated charges versus the value of the recovered materials, uranium and plutonium. The effects of yellowcake availability, properties of plutonium recycle fuels, safeguard and environmental costs on the value of the recovered products will also be included in the analysis.

The study will predict the timing for entry of a commercial nuclear fuel reprocessing industry.

804949

Project to evaluate efficiency and cost effectiveness of the following nutrient management and lake restoration pilot projects: creation of sod buffer zones along stream banks, construction of residential sedimentation ponds and installation of an aeration system in the reservoir.

II-299

STRUCTURE ACTIVITY CORRELATION STUDIES

START/ COMPL DATE : 09/76 - 09/78 : FUNDING : EST. - FY 77 / $ 70000
TASK/EPA CODE :N608A-086 / R804953-02 (GRANT) PRIOR FY / 1
PROJECT OFFICER : G D VEITH
INVESTIGATORS : V R MAGNUSON UNIV. OF MINNESOTA
D K HARRISS UNIV. OF MINNESOTA
MILE: 09/77 -DEVELOP QUIRY LANGUAGE FOR DATA BASE
09/78 -COMPLETE SOFTWARE FOR DATA BASE
07/79 -EXPAND DATA BASE

A COMPUTERIZED DATA BASE DEALING WITH TOXICITY AND BIOACCUMULATION OF COMPOUNDS ALONG WITH RELEVANT PHYSICAL PARAMETERS WILL BE ESTABLISHED. SUBSEQUENTLY, THIS DATA BASE WILL BE USED TO DETERMINE CORRELATIONS AMONG THE PHYSICAL PARAMETERS OF THE COMPOUNDS AND THEIR TOXICITY AND BIOACCUMULATION. SUCH CORRELATION STUDIES WILL ALLOW DEVELOPMENT OF A MODEL TO PREDICT TOXICITY AND BIOACCUMULATION OF OTHER COMPOUNDS NOT IN THE DATA BASE.

II- 300

804955

This is a study of the performance of electrostatic precipitators for the control of particulate emissions from nonferrous metallurgical smelters, roasters, and furnaces in zinc, lead, copper, and aluminum plants.

The study includes the characterization of airborne emissions from these operations and the preparation of a manual that can be used as a guide for the selection and improvement of control equipment.

Detailed data are to be obtained from operating installations on mass loadings, particle size distribution, and trace metal and gas concentrations. These data are to be combined with laboratory measurements of electrical resistivity of collected particulate matter and with operating data on the electrostatic precipitator control equipment. The information will be used in the analysis of precipitator performance by means of a computer model.

The project also includes the development of improved methods for sampling and analysis of effluent gases from metallurgical operations, especially methods of eliminating interferences from chemical reactions during sampling.

II-301

804974

This project will determine whether the selected pesticides have reproductive effects in female rats after post-implantation exposure. The effects on letter size and weight and effects on plancental, uterine and ovarian tissues will be examined. Male offspring of the experimental mothers will be tested for sterility effects and the female offspring for fecundity.

II-302

804975

The effects of chlordimeform and related compounds as an antagonist of contractions of vascular smooth induced by various vasoactive agents will be determined. The effects of these chemicals on calcium flux in vascular smooth muscle and on the release of norepinephrine from sympathetic nerves will also be determined. Also to be measured is the effect of chlordimeform on cardiovascular responses of the dog, and the interactions of this drug with other vasoactive agents.

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DETERMINATION OF THE ENVIRONMENTAL IMPACT OF SEVERAL SUBSTITUTE
CHEMICALS IN AGRICULTURALLY-AFFECTED WETLANDS
    START/ COMPL DATE :    09/76 - 10/79 : FUNDING : EST. - FY   77  / $   99250
     TASK/EPA CODE :Q608C-1-04   / R804976-02  (GRANT)  PRIOR  FY76 / $   997541
    PROJECT OFFICER : F G  WILKES
    INVESTIGATORS :    J W DAY                       LOUISIANA STATE UNIV. SYSTEMS
                       S P MEYERS                    LOUISIANA STATE UNIV. SYSTEMS
                       R P GAMBRELL                  LOUISIANA STATE UNIV. SYSTEMS
    MILE: 10/79 -FINAL REPORT
     A STUDY DESIGNED TO DEVELOP A MODEL SYSTEM APPROACH TO ANALYSIS OF BIOCIDE
      EFFECTS, ESPECIALLY THOSE OF GUTHION AND OTHER ORGANOPHOSPHOROUS
     PESTICIDES, IN ECOLOGICALLY DIVERSE LOCALITIES IN SOUTH LOUISIANA. PRIMARY
     OBJECTIVE IS TO ESTABLISH MEANS OF ALLEVIATING LAND USE CONFLICTS BETWEEN
      CHEMICAL DISCHARGES FROM AGRICULTURE AND WETLAND PRODUCTIVITY. PHASES
      OF THE STUDY INVOLVE LABORATORY ANALYSES OF TARGET COMPOUND S
     TABILITY UNDER DIVERSE PHYSICAL, CHEMICAL, AND MICROBIAL CONDITIONS AND FI
     ELD INVESTIGATIONS OF ORGANOPHOSPHORUS CHEMICAL BEHAVIOR, INCLUDING RUNOFF
      PATTERNS, BREAKDOWN AND BIOACCUMULATION IN THE AFFECTED AREAS.
     LABORATORY STUDIES OF THE INFLUENCE OF PH, OXIDATION-REDUCTION CONDITIONS,
     AND SALINITY ON THE PERSISTENCE OF GUTHION IN WETLAND SOILS ARE UNDERWAY.
      BASELINE STUDIES TO CHARACTERIZE THE COMMUNITY COMPOSITION OF PLANTS,
     AQUATIC AND BENTHIC ANIMALS, AND MICROBIAL POPULATIONS AT THE FIELD SITES
      HAVE BEEN INITIATED. DURING THE SECOND YEAR, LABORATORY STUDIES ON
     THE EFFECTS OF CONTROLLED PHYSIOCHEMICAL ENVIRONMENTS ON THE FATE OF
     THE TARGET COMPOUND WILL CONTINUE. FIELD APPLICATIONS OF GUTHION WILL BE
     INITIATED AND LABORATORY AND FIELD STUDIES OF THE EFFECTS OF THE
     PESTICIDES ON COMMUNITY COMPOSITION AND METABOLISM WILL BE CONDUCTED.
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EVALUATION OF TOXIC COMPONENTS & THEIR CONCENTRATION IN KRAFT & SULFITE
MILL EFFLUENTS
   START/ COMPL DATE :    10/76 - 09/78 : FUNDING : EST. - FY   77  / $   61000
    TASK/EPA CODE :B6108-411     / R804977-01  (GRANT)  PRIOR  FY76 / $   830001
   PROJECT OFFICER : V    DALLONS
   INVESTIGATORS :    J M LEACH                    BRITISH COLUMBIA RES. COUNCIL
                      A B MCKAUGE                  BRITISH COLUMBIA RES. COUNCIL
                      T E HOWARD                   BRITISH COLUMBIA RES. COUNCIL
                      C C WALDEN                   BRITISH COLUMBIA RES. COUNCIL
                      L T CHUNG                    BRITISH COLUMBIA RES. COUNCIL
   MILE: 07/76 -FUNDING PACKAGE SUBMITTED
         08/76 -AWARD FUNDS FOR PROJECT
         10/76 -FUNDING INCREMENT
         10/78 -FINAL REPORT RECEIVED
     OBJECTIVES: DEVELOP A CHEMICAL ANALYSIS PROCEDURE FOR RAPID MEASUREMENT OF
      TOXIC MATERIALS CONCENTRATION IN BLEACHED AND UNBLEACHED KRAFT
     WHOLE MILL EFFLUENTS, GROUNDWOOD EFFLUENTS AND SULFITE MILL EFFLUEN
     TS; AND RELATE THE CHEMICAL ASSAY RESULTS TO EFFLUENT TOXICITY MEASURED IN
      BIOASSAYS USING RAINBOW TROUT. APPROACH: THE EXPERIMENTAL WORK WILL
     BE CARRIED OUT IN TWO PHASES: A) DEVELOPMENT OF THE ANALYTICAL PROCEDURE
     AND DEMONSTRATION OF A RELATIONSHIP BETWEEN ANALYTICAL RESULTS AND EFFLU
     ENT TOXICITY. ALSO, TOXIC LOADINGS IN EFFLUENTS FROM VARIOUS TYPES OF PULP
      MILLS. A FINAL REPORT WILL BE ISSUED DETAILING FINDINGS OBTAINED FROM
     THIS EFFORT.
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II-305

NOX EMISSIONS FROM FLUIDIZED COMBUSTION

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START/ COMPL DATE :    10/76 - 05/79 : FUNDING : EST. - FY   77  / $  150000
 TASK/EPA CODE :F623A-05      / R804978       (GRANT)  PRIOR  FY76 / $  1000001
PROJECT OFFICER : W     STEEN
INVESTIGATORS :    J M BEER                        MASS. INST. OF TECHNOLOGY
MILE: 04/77 -INSTALLATION OF 7.5 CM BATCH TYPE COMBUSTOR
      09/77 -DESIGN AND INSTALLATION OF 30 X 30 CM AFB AND SAMPLING TRAIN
      10/78 -DESIGN AND CONSTRUCT 10 CM PFB
      04/79 -COMPLETE DATA ANALYSIS
      05/79 -COMPLETE MATHEMATICAL MODEL DEVELOPMENT
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OBJECTIVES OF THE PROGRAM ARE: 1. TO DEVELOP A MECHANISTIC MATHEMATICAL MODEL FOR THE PREDICTION OF NO EMISSION FROM COAL BURNING FLUIDIZED BEDS. 2. TO PROVIDE PHYSICAL-CHEMICAL INPUT PARAMETERS FOR THE MODEL BY AN EXPERIMENTAL STUDY OF THE NO FORMATION-DESTRUCTION PROCESSES IN FLUIDIZED BEDS. 3. TO GENERATE INFORMATION NECESSARY FOR THE DEVELOPMENT OF NEW CONTROL TECHNOLOGY OF NOX EMISSION BASED ON DETAILED PILOT PLANT SCALE AND BENCH SCALE STUDIES AT BOTH ATMOSPHERIC AND ELEVATED PRESSURE. 4. TO TEST THE MATHEMATICAL MODELS SEVERELY OVER SUFFICIENTLY WIDE RANGES OF OPERATING VARIABLES. APPROACH TO BE USED: THE EXPERIMENTAL STUDY CONSISTS OF TWO PARALLEL INVESTIGATIONS: 1. THE STUDY OF THE NO FORMATION-DESTRUCTION PROCESSES IN CONTINUOUSLY OPERATED FLUIDIZED COMBUSTORS: 2. BATCH TYPE KINETIC STUDIES CARRIED OUT WITH THE 7.5 CM DIA EXTERNALLY HEATED FLUIDIZED BED AND THE 10 CM DIA PFB. IN THE CONTINUOUS FLUIDIZED COMBUSTION EXPERIMENTS THE SPATIAL DISTRIBUTIONS OF THE GASEOUS AND SOLID SPECIES CONCENTRATIONS AND OF TEMPERATURE WILL BE DETERMINED IN THE FLUIDIZED BED AND THE FREEBOARD FOR THE VARIATION OF OPERATIONAL AND DESIGN PARAMETERS. A BATCH TYPE COMBUSTOR WILL BE USED TO INVESTIGATE THE CHAR OXIDATION REACTION. THE EXPERIMENTAL DATA FROM THE CONTINUOUS COMBUSTOR AND THE BATCH COMBUSTOR WILL BE USED TO TEST THE MODEL FOR THE FORMATION AND DEFORMATION OF NO IN FLUIDIZED BED COMBUSTORS. EXPECTED OUTPUTS ARE: 1. AN UNDERSTANDING OF THE MECHANISM OF FORMATION AND DESTRUCTION OF "FUEL NO" IN FLUIDIZED BEDS. 2. THE MODEL OF NO EMISSION WILL PROVIDE INFORMATION FOR THE SCALING UP AND FURTHER DEVELOPMENT OF FLUIDIZED COMBUSTION PLANTS.

II-306

POLLUTANTS FROM SYNTHETIC FUELS PROCESSES

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START/ COMPL DATE :     11/76 - 10/81 : FUNDING : EST. - FY   77  / $  829856
 TASK/EPA CODE :F623A-24       / R804979-02  (GRANT)  PRIOR  FY76 / $  3000001
PROJECT OFFICER : T W  PETRIE
INVESTIGATORS :     F O MIXON                         RES. TRIANGLE INSTITUTE
                    J   CLELAND                       RES. TRIANGLE INSTITUTE
                    D   WAGONER                       RES. TRIANGLE INSTITUTE
                    D   ROSENTHAL                     RES. TRIANGLE INSTITUTE
                    R   ZWEIDINGER                    RES. TRIANGLE INSTITUTE
                    C   SPARICINO                     RES. TRIANGLE INSTITUTE
MILE: 07/77 -REACTOR FACILITY AND ANALYSIS EQUIPMENT OPERATIONAL
      12/77 -TEST PLAN FORMULATED
      12/78 -KINETICS OF POLLUTANT FORMATION SCREENED
      10/79 -KINETICS OF POLLUTANT FORMATION MEASURED THOROUGHLY
      11/80 -ENVIRONMENTAL ASSESSMENT COMPLETED
      07/81 -RECOMMENDATIONS FOR CONTROL STRATEGIES MADE
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THE PURPOSE OF THE RESEARCH IS TO DEVELOP A FUNDAMENTAL UNDERSTANDING OF THOSE FACTORS AND CONDITIONS WHICH CAUSE THE PRODUCTION OF ENVIRONMENTAL POLLUTANTS IN SYNFUELS PROCESSES AND TO PROVIDE TO EPA AND TO THE SCIENTIFIC AND TECHNICAL COMMUNITY THE INFORMATION NEEDED TO GUIDE THE CONTROL OF POTENTIALLY HAZARDOUS MATERIALS FROM SYNFUELS PLANTS OF THE FUTURE. THE RESEARCH PLAN INCLUDES BOTH AN EXPERIMENTAL AND AN ANALYTICAL STUDY. THE EXPERIMENTAL STUDY INCLUDES FIRST THE DESIGN, FABRICATION AND OPERATION OF ONE OR MORE LABORATORY REACTORS TO SIMULATE CONDITIONS WHICH MAY BE UYILIZED IN ACTUAL SYNFUELS PLANTS, THE DEVELOPMENT AND IMPLEMENTATION OF CHEMICAL ANALYSIS PROCEDURES FOR THE EVALUATION OF ELEMENTS AND COMPOUNDS THAT RESULT, FOR SCREENING OF THE MAJOR COALS WHICH ARE AVAILABLE IN THE U.S., AND FOR THE DETERMINATION OF THE KINETICS OF FORMATION OF THE POLLUTANTS OF SIGNIFICANCE. THE ANALYTICAL STUDY PROVIDES FOR UTILIZING RESULTS OF THE SCREENING TESTS TO (1) PROJECT POTENTIAL HUMAN EXPOSURE TO EFFLUENTS AND EMISSIONS FROM THESE PLANTS AND (2) ESTABLISH PRIORITY RATINGS FOR THE VARIOUS POLLUTANTS BASED UPON THE EXTENT TO WHICH PROJECTED EXPOSURES ARE HAZARDOUS.

II-307

DEVELOPMENT & APPLICATION OF MULTIPLE TRACER TECHNIQUES FOR THE STUDY OF POLLUTANT TRANSPORT AND DISPERSION IN THE ATMOSPHERE
START/ COMPL DATE : 11/76 - 10/77 : FUNDING : EST. - FY 77 / $ 13500
TASK/EPA CODE :06258-EA-18 / R804990-01 (GRANT) PRIOR FY76 / $ 540001
PROJECT OFFICER : - SCHIERMEIER
INVESTIGATORS : F. H SHAIR CALIF. INST. OF TECHNOLOGY
MILE: 09/77 -DATA REPORT

THIS IS A PROPOSAL REQUESTING SUPPORT FOR THE FURTHER DEVELOPMENT AND APPLICATION OF MULTIPLE ATMOSPHERIC TRACER TECHNIQUES. THE ANALYTICAL APPROACH IS TO EXTEND THE USE OF ELECTRON CAPTURE GAS CHROMATOGRAPHY. RECENTLY, WITH THE HELPFUL SUGGESTIONS GIVEN TO US BY RAY DIXON, WE HAVE DEVELOPED SYSTEMS WHICH SEPARATE SF6, CBRF3, CCL2F2, O2, AND CBR2F2 INTO SHARP DISTINCT PEAKS, THE LAST OF WHICH ELUTES WITHIN 200 SECONDS FROM THE TIME OF INJECTION. THE REST OF THE SYSTEM DEVELOPMENT IS TO DEVELOP THE CAPABILITY TO ACCURATELY ANALYZE AT LEAST 1000 AIR SAMPLES PER DAY. THE FIRST EXTENDED APPLICATION OF THIS MULTIPLE TRACER TECHNIQUE WOULD BE TO DETERMINE THE TRANSPORT AND EXTENT OF DISPERSION ASSOCIATED WITH: (1) URBAN SOURCES (EMITTED AT LOW LEVELS) AND (2) RURAL POWER PLANT PLUMES EMITTED AT HIGH LEVELS. SPECIFIC EXPERIMENTS ARE PLANNED TO ACCURATELY DETERMINE THE EXTENT OF VERTICAL DISPERSION ASSOCIATED WITH PLUMES TRAVELING OVER RURAL REGIONS AND OVER URBAN REGIONS.

THE ROLE OF SEDIMENTS IN THE STORAGE, MOVEMENT AND BIOLOGICAL UPTAKE OF KEPONE IN ESTUARINE ENVIRONMENTS

START/ COMPL DATE : 10/76 - 09/78 : FUNDING : EST. - FY 77 / $ 100000
TASK/EPA CODE :Q608C-1-03 / R804993-01 (GRANT) PRIOR FY76 / $ 1775701
PROJECT OFFICER : T T DAVIES
INVESTIGATORS : R J HUGGETT VIRGINIA INST. OF MARINE SCI.
M NICHOLS VIRGINIA INST. OF MARINE SCI.
D S HAVEN VIRGINIA INST. OF MARINE SCI.
MILE: 09/77 -DISTRIBUTION OF KEPONE IN JAMES RIVER SEDIMENT/BIOTA/WATER
09/78 -REPORT ON BIOLOGICAL AND PHYSICAL PROCESSES TRANSPORTING KEPONE

THE PROGRAM WILL STUDY THE FOLLOWING ASPECTS OF KEPONE IN THE JAMES RIVER, VIRGINIA: (1) THE DISTRIBUTION OF KEPONE IN BOTTOM SEDIMENTS OF THE JAMES WILL BE DETERMINED. (2) THE ROUTES OF SEDIMENT TRANSPORT BELOW HOPEWELL WILL BE DELINEATED. (3) MAJOR SEDIMENT SINKS WILL BE LOCATED AND THE RATES OF SEDIMENT DEPOSITION AT THESE SITES WILL BE DETERMINED. THE SIZE, LOCATION AND MOBILITY OF THE KEPONE RESERVOIR IN THE JAMES CAN BE DETERMINED FROM THIS INFORMATION. (4) THE EFFECT OF VARYING ENVIRONMENTAL CONDITIONS OF PH AND SALINITY ON RELEASE OF KEPONE FROM SEDIMENTS WILL BE DETERMINED. THIS DATA WILL PROVIDE ESTIMATES OF WHETHER KEPONE ABSORBED TO SEDIMENTS IS RELEASED TO THE AQUEOUS PHASE AS THE SEDIMENTS ARE MOVED DOWNSTREAM INTO AREAS OF HIGHER PH AND SALINITY. (5) THE ABILITY OF FILTER FEEDING ORGANISMS TO CONCENTRATE KEPONE FROM CONTAMINATED SEDIMENTS WILL BE DETERMINED. DATA FROM THIS STUDY WILL PROVIDE FOR A DETERMINATION OF THE POTENTIAL HAZARDS WHICH DREDGING POSES TO A VARIETY OF FILTER FEEDING ORGANISMS.

II-309

THE GENERALIZATION OF WATER QUALITY CRITERIA USING CHEMICAL MODELS

START/ COMPL DATE :   10/76 - 10/79 : FUNDING : EST. - FY 77 / $ 61317
TASK/EPA CODE :N608A-087   / R804996-02 (GRANT) PRIOR FY76 / $ 462621
PROJECT OFFICER : G E GLASS
INVESTIGATORS : D K HARRISS   UNIV. OF MINNESOTA
V R MAGNUSON   UNIV. OF MINNESOTA
MILE: 10/78 -COMPLETE DRAFT OF REVISED CHEMICAL SPECIATION MODEL
10/79 -COMPLETE FINAL REVISED CHEMICAL SPECIATION MODEL
10/79 -APPLY MODEL TO REPRESENTATIVE WATER QUALITY CRITERIA

THE FINAL GOAL FOR THIS PROJECT IS THE CORRELATION OF TOXICITY IN A PARTICULAR ECOSYSTEM WITH CHEMICAL SPECIATION AND USE OF THESE CORRELATIONS TO DETERMINE REALISTIC WATER STANDARDS. BIOLOGICAL ACTIVITY MOST COMMONLY CORRELATES BEST WITH SPECIFIC FORMS OR SPECIES OF CONTAMINANTS AND WATER QUALITY STANDARDS WOULD BE MORE SOUNDLY STRUCTURED ON THE PROBABILITY OF AN OFFENDING SPECIES BEING PRESENT OR AVAILABLE. THREE AREAS OF ACTIVITY ARE INVOLVED IN MEETING PROJECT GOALS: A. PREDICTIVE COMPUTER MODELING UTILIZING SPECIATION AND TOXICITY DATA; B. ASSEMBLING A DATA BASE ON SPECIATION FROM LITERATURE, EXPERIMENT, AND ESTIMATION. C. COLLECTION AND INTERPRETATION OF TOXICITY DATA FROM LITERATURE AND EXPERIMENTATION. TO DATE, SUBSTANTIAL PROGRESS HAS BEEN MADE ON PARTS A AND B.

II-310

STANDARDS FOR AND METHODS OF ANALYSIS OF RAINWATER FOR ACIDITY

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   START/ COMPL DATE :    09/76 - 09/78 : FUNDING : EST. - FY   77  / $   25400
    TASK/EPA CODE :E601B-03     / R804998     (GRANT)  PRIOR  FY76 / $   159001
   PROJECT OFFICER : G D  VEITH
   INVESTIGATORS :   S Y TYREE                      COLL. OF WILLIAM & MARY
   MILE: 09/77 -DEVELOP QUIRY LANGUAGE FOR DATA BASE
         09/78 -COMPLETE SOFTWARE FOR DATA BASE
         07/79 -EXPAND DATA BASE
     PROVIDE A PROCEDURE WHICH WILL SUCCESSFULLY PRODUCE SOLUTIONS WITH
     SELECTED CHARACTERISTICS OF RAINWATER, EXAMINE THE CHEMISTRY OF POSSIBLE
     INTERACTIONS OF POTENTIAL INGREDIENTS AND ATTEMPT TO SELECT A SET WHICH
     WILL REMAIN STABLE UNDER CONDITIONS OF PACKAGING AND PRODUCE DESIRED
     SOLUTION BEHAVIOR WHEN USED. A RECIPE FOR PREPARING RELEVANT SOLUTION.
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II-311

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INVESTIGATION OF TREATMENT TECHNOLOGIES FOR DYE MANUFACTURE WASTE

   START/ COMPL DATE :    00/00 - 00/00 : FUNDING : EST, - FY   77  / $   55000
    TASK/EPA CODE :B610B-140     / R805002-01  (GRANT)  PRIOR  FY76 / $   800001
   PROJECT OFFICER : L    WEITZMAN
   INVESTIGATORS :   T M KEINATH
                     J L GADDIS                           CLEMSON UNIVERSITY
                     H G SPENCER                          CLEMSON UNIVERSITY
                     T E POLLACK                          CLEMSON UNIVERSITY
   MILE: 06/77 -FUNDING PACKAGE SUBMITTED                 CLEMSON UNIVERSITY
         08/77 -AWARD FUNDS FOR PROJECT
    THE PROPOSED STUDY WILL INVESTIGATE TREATMENT TECHNOLOGIES FOR A TYPICAL
    DYE WASTEWATER, WET OXIDATION, OZONATION AND HYPERFILTRATION WILL
    BE INVESTIGATED AS PRETREATMENT STEPS FOR RENDERING REFRACTORY DYE WASTE
    CONSTITUENTS AMENABLE TO SUBSEQUENT TREATMENT BY BIOLOGICAL, ACTIVATED
    CARBON, AND COMBINED BIOLOGICAL-ACTIVATED CARBON SYSTEMS, OPTIMUM DESIGN
    CRITERIA WILL BE DEVELOPED FOR EACH OF THE PRETREATMENT STEPS AND FOR EACH
     OF THE SUBSEQUENT TREATMENT SYSTEMS, ANALYSES WILL BE MADE FOR SELECTED
     TOXIC COMPOUNDS ACROSS THE PRETREATMENT STEPS AND ACROSS EACH OF THE
    TREATMENT SYSTEMS TO DETERMINE THE REMOVAL OF TOXIC SUBSTANCES AND TO
    INVESTIGATE THE POSSIBILITY OF PRODUCING TOXIC SUBSTANCES IN EACH UNIT
     PROCESS. A COMPLETE COST ANALYSIS WILL BE MADE FOR EACH TREATMENT ME
    CHANISM, THIS IS IN KEEPING WITH THE EPA GOAL OF DEFINING AND IMPLEMENTING
    BATEA BY 1983.
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DESIGN OF EXPERIMENTS, STATISTICAL ANALYSES, AND EVALUATION OF AQUATIC RESEARCH DATA

START/ COMPL DATE : 10/76 - 10/78 : FUNDING : EST. - FY 77 / $ 45675
TASK/EPA CODE :Q625A-1-09 / R805007-01 (GRANT) PRIOR FY76 / $ 330001
PROJECT OFFICER : W P DAVIS

INVESTIGATORS :		
	R G DOMEY	UNIV. OF TEXAS
	B A MAASKANT	UNIV. OF TEXAS

MILE: 10/78 - FINAL REPORT

OBJECTIVES: CONSULTATION ON DESIGNS OF RESEARCH ANALYSIS OF AQUATIC RESEARCH DATA, INCLUDING EVALUATION AND INTERPRETATION OF RESEARCH RESULTS WHEN REQUIRED. APPROACH: THE APPROACH IS MATHEMATICAL/STATISTICAL ACCOMPANIED BY APPROPRIATE GRAPHIC REPRESENTATION. PROGRESS: CERTAIN PRELIMINARY PILOT STATISTICAL PROGRAMS HAVE BEEN TESTED AND THE RESULTS ARE ON FILE AT THE GULF BREEZE ENVIRONMENTAL RESEARCH LABORATORY, BEARS BLUFF FIELD STATION, P. O. BOX 368, JOHNS ISLAND, SOUTH CAROLINA. CURRENT PLANS: PROCEED, AS REQUIRED; DESIGNS OF EXPERIMENTS, FURTHER DEVELOPMENT OF STATISTICAL METHODS, DATA ANALYSIS, EVALUATION AND INTERPRETATION OF RESULTS, AS NEEDED.

The long-term goal of this program is the development of a chemical model system for the synthesis of potent yet environmentally safe pesticides. As our initial test agents we will use halogenated hydrocarbons belonging to the aldrin and diedrin family. Our studies are designed to: a) differentiate between the carcinogenic vs insecticida chemical features of these compounds; b) determine the mode of action by which these agents act as chemical carcinogens; c) design a predictive model system for the synthesis of active pesticides wherein the active carcinogenic and mutagenic functional sites of the molecule have been eliminated without sacrificing insecticidal action; d) design new analogs of aldrin and dieldrin which have been chemically modified to make them ecologically less persistent. The immediate goals of this proposal include: a) the synthesis of a series of rationally designed structural analogs of aldrin and dieldrin and its chemically related species; b) the in vitro biological evaluation of the cytotoxic, mutagenic and carcinogenic potentials of these compounds alone and in combination with oncogenic viruses; c) evaluation of the pesticidal effectiveness of the parent compounds and their rationally designed analogs and d) a determination of the mechanism by which radiolabeled pesticides interact with cellular DNA, RNA and protein.

Test compounds with preliminary in vivo activity in our insect test systems, will be analyzed for their ability to a) induce DNA damage, b) inhibit DNA repair processes. Utilizing ^{14}C-labeled compounds of high specific activity we will compare the deoxynucleoside-pesticide (DN-P) profile of these compounds and their differential rate of removal in order to specifically determine the (DN-P) product(s) responsible for any carcinogenic or mutagenic properties of these agents.

STUDY OF PATHOGENIC FREE-LIVING AMOEBA IN FRESH WATER LAKES IN VIRGINIA

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START/ COMPL DATE :    11/76 - 10/79 : FUNDING : EST. - FY   77  / $   44710
 TASK/EPA CODE :D607A-013    / R805014-01  (GRANT)  PRIOR  FY   /          1
PROJECT OFFICER : W    JAKUBOWSKI
INVESTIGATORS :    R J DUMA                          VIRGINIA COMMONWEALTH UNIV.
                   S   CHANG                         U.S. ENVIRON. PROTECTION AGCY
MILE: 11/77 -ANNUAL REPORT
      11/78 -ANNUAL REPORT
      11/79 -FINAL REPORT
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TEN FRESH WATER LAKES WITHIN A RADUS OF 27 MILES LOCATED IN AND SURROUNDING THE VICINITY OF RICHMOND, VIRGINIA, AND BEING CONTINUOUSLY SAMPLED IN SEARCH OF PATHOGENIC FREE-LIVING AMOEBAE, PARTICULARLY OF THE GENUS NAEGLERIA. LARGE VOLUMES OF WATER FILTERED THROUGH SAND COLUMNS AND SOIL BOTTOMS FROM THE SAME AREAS ARE SUBJECTED TO TEMPERATURE SELECTIVE CULTURAL PROCEDURES (43 DEGREES C). SAMPLING IS PERFORMED REGULARLY AND BIWEEKLY. ISOLATES ARE SUBJECTED TO FLUORESCENT ANTIBODY AND MOUSE INOCULATION TESTS AND FORWARDED TO DR. CHANG AT THE EPA IN CINCINNATI, OHIO FOR FURTHER TISSUE CULTURE STUDIES FOR PATHOGENICITY.

PERFORMANCE OF ALTERNATE COATINGS IN THE ENVIRONMENT (PACE)

START/ COMPL DATE : 02/77 - 09/79 : FUNDING : EST. - FY 77 / $ 35000
TASK/EPA CODE :B604B-460 / R805027-01 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : C DARVIN
INVESTIGATORS : J D KEANE STEEL STRUCTURES PAINT. COUN.
J A BRUNO STEEL STRUCTURES PAINT. COUN.
R E WEAVER STEEL STRUCTURES PAINT. COUN.
MILE: 02/77 -FUNDING PACKAGE SUBMITTED
03/77 -AWARD FUNDS FOR PROJECT
09/79 -FINAL REPORT RECEIVED

THE PRIMARY PURPOSE OF THIS STUDY IS TO PROVIDE INFORMATION ON ALTERNATE COATING SYSTEMS DESIGNED TO COMPLY WITH PUBLIC LEGISLATION, POLLUTION RULES, AND OTHER PRESENT AND EXPECTED REQUIREMENTS DURING EACH STAGE OF APPLICATION AND USE. IT IS THEREFORE PROPOSED THAT THE STEEL STRUCTURES PAINTING COUNCIL CONDUCT A RESEARCH AND EVALUATION PROGRAM TO COMPARE THE DURABILITY AND OTHER CHARACTERISTICS OF THESE NEW METHODS AND MATERIALS WITH THOSE OF TYPICAL STANDARD CONVENTIONAL COATING SYSTEMS FOR STEEL. SOME UNIQUE FEATURES OF THIS STUDY INCLUDE: EXTENSIVE CONTROLS, REPEATED PERIODICALLY; OPEN EVALUATIONS TO PROVIDE WIDE CHOICES OF PAINT SYSTEMS AT EACH LEVEL OF PERFORMANCE; CHOICE AND RATING OF CANDIDATE PRODUCTS GUIDED BY A BALANCED COMMITTEE OF SPECIALISTS, REPRESENTING BOTH PRODUCERS AND USERS; EARLY PREPARATION OF A "STATE-OF-THE-ART REPORT"; RESULTS EXPRESSED IN GENERIC TERMS, WHEN POSSIBLE, FOR MAXIMUM APPLICABILITY; OUTSTANDING PROPRIETARY PERFORMERS CAN LATER BE IDENTIFIED, WITH SUPPLIERS' FULL WRITTEN APPROVAL.

805028

II-316

Grant will improve lake quality by increasing lake depth, removing emergent vegetation, establishing buffer zones, street sweeping and a public eduction program.

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EVALUATION OF SOCIO-ECONOMIC MEASURES

    START/ COMPL DATE :    08/77 - 04/78 : FUNDING : EST. - FY   77  / $   65000
     TASK/EPA CODE :K609A-415    / R805036-01  (GRANT)  PRIOR  FY   /          1
    PROJECT OFFICER : J W  FALCO
    INVESTIGATORS :    J   KUHNER                    META SYSTEMS INCORPORATED
                     S J ROBINSON                    META SYSTEMS INCORPORATED
                     R P BURDEN                      META SYSTEMS INCORPORATED
                     R J DELUCIA                     META SYSTEMS INCORPORATED
                     D F LUECKE                      META SYSTEMS INCORPORATED
    MILE: 08/77 -START PROJECT
          04/78 -FINAL REPORT SUMMARIZING RESULTS OF STUDY
     THE OBJECTIVES OF THIS WORK ARE THE DETERMINATION OF THE FEASIBILITY OF
     DEVELOPING A METHODOLOGY TO ASSESS THE SOCIO-ECONOMIC IMPACTS OF INSTITU
     TING VARIOUS WATER POLLUTION CONTROL STRATEGIES, AND THE IDENTIFICATION OF
      INSTITUTIONAL PROBLEMS ASSOCIATED WITH ZONING POLICIES ESTABLISHED TO
     CONTROL CONVERSION OF NONURBAN TO URBAN LAND. THE OBJECTIVES OF THIS STUDY
     WILL BE ACCOMPLISHED BY A LITERATURE SURVEY AND ANALYSIS OF AVAILABLE
      METHODS. THE STUDY WILL BE ORGANIZED INTO FOUR TASKS THAT SURVEY
     AVAILABLE TECHNOLOGY, DETERMINE COSTS AND RELATIONSHIPS OF COSTS TO ENVIR
     ONMENTAL SETTING, ENUMERATE AVAILABLE FINANCING METHODS, AND IDENTIFY MONI
     TORING, ENFORCEMENT AND INCENTIVES POSSIBILITIES. THE RESULTS OF THE STUDY
      AND RECOMMENDATIONS FOR FURTHER RESEARCH IN SOCIO-ECONOMICS RESEARCH WILL
      BE PUBLISHED AT THE END OF THE PROJECT.
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II-318

INTERNATIONAL SYMPOSIUM ON SULFUR IN THE ATMOSPHERE, DUBROVNIK, YUGOSLAVIA
START/ COMPL DATE : 03/77 - 03/78 : FUNDING : EST. - FY 77 / $ 43000
TASK/EPA CODE :G6258-EA-19 / R805043-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : W E WILSON
INVESTIGATORS : R B HUSAR WASHINGTON UNIVERSITY
J D HUSAR WASHINGTON UNIVERSITY
MILE: 03/78 -PUBLICATION OF PROCEEDINGS

THIS SYMPOSIUM SHOULD BRING TOGETHER AMERICAN, EUROPEAN AND OTHER PARTICIPANTS TO REPORT AND DISCUSS THE CURRENT ISSUES ON THE ATMOSPHERIC SULFUR PROBLEMS. IT IS ESTIMATED THAT THE GLOBAL EMISSION FROM ANTHROPOGENIC SOURCES ARE OF THE SAME ORDER OF MAGNITUDE AS EMISSION FROM NATURAL SOURCES. HOWEVER, MORE THAN 90% OF ANTHROPOGENIC SO2 EMISSIONS ARE IN THE NORTHERN ATMOSPHERE. IT HAS BEEN RECOGNIZED THAT THE ANTHROPOGENIC SULFUR PROBLEM IS A REGIONAL ONE ON THE SPATIAL SCALE OF THOUSANDS OF KILOMETERS. THE HORIZONTAL AND VERTICAL DISPERSION MECHANISMS, REMOVAL RATES BY DRY AND WET DEPOSITION, SO2 OXIDATION RATES AND MECHANISMS, THE PARTICULATE SULFUR SIZE DISTRIBUTION, SPATIO-TEMPORAL DISTRIBUTION AND CHEMISTRY OF AEROSOL SULFUR COMPOUNDS AND ASSOCIATED MEASUREMENT TECHNIQUES WILL BE DISCUSSED. THE SYMPOSIUM IS CO-SPONSORED BY UNITED NATIONS ENVIRONMENT PROGRAMME, ELECTRIC POWER RESEARCH INSTITUTE, U.S. ENVIRONMENTAL PROTECTION AGENCY, U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION, AMERICAN METEOROLOGICAL SOCIETY UNDER THE AUSPICES OF YUGOSLAV ACADEMY OF SCIENCES AND ARTS.

II-319

EVALUATION OF DREDGING AS A LAKE RESTORATION TECHNIQUE

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START/ COMPL DATE :    07/77 - 06/80 : FUNDING : EST. - FY   77  / $  211913
 TASK/EPA CODE :M412A-15      / R805046-01  (GRANT)  PRIOR  FY   /          1
PROJECT OFFICER : S A  PETERSON
INVESTIGATORS :    C D MCNABB                         MICHIGAN STATE UNIVERSITY
MILE: 06/80 -FINAL REPORT
   THE PROJECT WILL ASSESS THE EFFECTS OF LAKE RESTORATION VIA DREDGING AT L
   AKE LANSING. IT PROPOSES TO DO THIS BY EVALUATING CHANGES IN PRODUCTION OF
   PLANTS, INVERTEBRATE ANIMALS, AND FISH AS A RESULTS OF DREDGING, BY CORRE
   LATING CHANGES IN PRODUCTION WITH CHANGES IN PHYSICAL AND CHEMICAL ASPECTS
    OF THE LAKE, BY DEVELOPING AN ANNUAL NUTRIENT BUDGET TO MAKE MEASUREME
   NTS AGAINST, AND BY DETERMINING THE ECOLOGICAL IMPACTS OF DREDGED MATERIAL
   ON THEIR DISPOSAL SITES.
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ADAPTATION OF AQUATIC ECOSYSTEM MODEL FOR APPLIED USES

START/ COMPL DATE : 01/77 - 12/78 : FUNDING : EST. - FY 77 / $ 124680
TASK/EPA CODE :K609A-405 / R805047-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : T O BARNWELL
INVESTIGATORS : R A PARK RENSSELAER POLYTECHNIC INST.
MILE: 01/77 -START PROJECT
12/77 -INTERIM REPORT
12/78 -FINAL REPORT

THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. AN ECOLOGICAL LAKE MODEL WILL BE MODIFIED TO INCORPORATE TRANSPORT CHARACTERISTICS NECESSARY TO DESCRIBE THE MOVEMENT OF MATERIAL IN A LAKE ECOSYSTEM. MODIFICATIONS WILL ALSO BE DEVELOPED TO INCLUDE LUXURY UPTAKE OF NUTRIENTS AND LIGHT ADAPTATION PHENOMENA. DEVELOPMENT WILL PROCEED WITH INTERFACE REQUIREMENTS INTO THE HYDROLOGIC UNIT MODEL IN MIND -- ALSO, INTERFACE WITH APPROPRIATE NPS MODELS FOR SHORE DEVELOPMENT ANALYSIS. THE LAKE ECOSYSTEM MODEL, CLEANER, WILL BE MODIFIED AS OUTLINED ABOVE. THE PROJECT IS ON SCHEDULE. A DRAFT FINAL REPORT IS EXPECTED 1 JULY 1978.

ENVIRONMENTAL AND TECHNOLOGICAL ANALYSIS OF THE USE OF SURPLUS WOOD AS AN INDUSTRIAL FUEL

START/ COMPL DATE : 07/77 - 05/78 : FUNDING : EST. - FY 77 / $ 57000
TASK/EPA CODE :1B624B-546 / R805050-01 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : H M FREEMAN
INVESTIGATORS : E H HALL BATTELLE MEMORIAL INSTITUTE
W T LAWHON BATTELLE MEMORIAL INSTITUTE
C M ALLEN BATTELLE MEMOPIAL INSTITUTE
MILE: 07/77 -FUNDING PACKAGE SUBMITTED
08/77 -AWARD FUNDS FOR PROJECT
05/78 -FINAL REPORT

THERE IS A WIDESPREAD INTEREST IN THE USE OF SURPLUS WOOD AS AN INDUSTRIAL FUEL BECAUSE IT DOES NOT CONTAIN SULFUR, IT IS A RENEWABLE RESOURCE, AND THE TECHNOLOGY FOR ITS USE IS AVAILABLE. THERE ARE, HOWEVER, SOME UNRESOLVED QUESTIONS WHICH MUST BE ADDRESSED AT THIS TIME IN ORDER TO BE SURE THAT NO LONG-RANGE DETRIMENTAL EFFECTS WOULD RESULT FROM A GREATLY EXPANDED WOOD-FUEL INDUSTRY. THE OBJECTIVES OF THIS PROJECT ARE: 1. TO ANALYZE THE POTENTIAL AVAILABILITY OF SURPLUS WOOD BY REGION AND COMPARE THAT AVAILAPILITY WITH POTENTIAL REGIONAL DEMAND FOR WOOD FUEL. 2. TO ASSESS THE CURRENT STATE OF THE TECHNOLOGY FOR THE PROCUREMENT AND UTILIZATION OF SURPLUS WOOD FUEL, TO PROJECT POTENTIAL CONSUMPTION OF WOOD FUEL ON THE BASIS OF EXISTING TECHNOLOGY, AND TO IDENTIFY ANY TECHNOLOGY-RELATED RESEARCH AND DEVELOPMENT NEEDS. 3. TO ASSESS THE ENVIRONMENTAL/ECOLOGICAL IMPACTS WITH RESPECT TO SO2 EMISSIONS, AND WITH RESPECT TO POTENTIAL LONG-RANGE IMPACTS ON OUR FORESTS.

TECHNICAL AWARENESS IN THE NONFERROUS METALS INDUSTRY - PILOT STUDY
-TANMIPS

START/ COMPL DATE : 02/77 - 11/77 : FUNDING : EST. - FY 77 / $ 42000
TASK/EPA CODE :B604C-560 / R805095-01 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : A B CRAIG
INVESTIGATORS : E S BARTLETT BATTELLE MEMORIAL INSTITUTE
R H CHERRY BATTELLE MEMORIAL INSTITUTE
MILE: 02/77 -FUNDING PACKAGE SUBMITTED
03/77 -AWARD FUNDS FOR PROJECT
11/77 -FINAL REPORT RECEIVED

THE OBJECTIVE IS TO PILOT A SIMPLE, INEXPENSIVE SYSTEM TO PROVIDE, MAINTAIN, AND COMMUNICATE TO IERL/CINCINNATI AN UP-TO-DATE AWARENESS AND ASSESSMENT OF TECHNOLOGICAL DEVELOPMENTS IN THE NONFERROUS METALS INDUSTRIES THAT ARE BELIEVED TO HAVE SIGNIFICANT ENVIRONMENTAL IMPACT. APPROACH - INFORMATION WILL BE GATHERED BY REVIEW OF THE PERIODICAL LITERATURE, SPECIAL REPORTS, AND LIMITED TRAVEL VISITS, AND INTERVIEWS. OUTPUT - THE PRODUCT OF THIS PROPOSED PROGRAM WILL BE SIX BIMONTHLY AWARENESS BULLETINS WHICH WILL BE GIVEN LIMITED DISTRIBUTION WITHIN IERL-CINCINNATI. THE OUTPUT WILL BE ARRANGED IN A PHYSICAL MANNER AND FORMAT SO AS TO PERMIT RAPID METHODICAL STORAGE AND RETRIEVAL OF THE INFORMATION.

METHODOLOGY FOR ABATEMENT OF COMBINED SEWER OVERFLOWS FOR AN URBAN LAKE

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START/ COMPL DATE :    05/77 - 04/78 : FUNDING : EST. - FY   77  / $   18860
 TASK/EPA CODE :C611A-7097    / R805096      (GRANT)  PRIOR  FY    /          1
PROJECT OFFICER : R     FIELD
INVESTIGATORS :    P E MOFFA                          ONONDAGA CO. DEPT. OF DRAINAG
                   J M KARANIK                        ONONDAGA CO. DEPT. OF DRAINAG
                   J C BYRON                          ONONDAGA CO. DEPT. OF DRAINAG
MILE: 05/77 -START PROJECT
      04/78 -FINAL REPORT PUBLISHED
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THE OBJECTIVE OF THIS STUDY IS TO DEVELOP A METHODOLOGY FOR DETERMINING THE NECESSARY STEPS A COMMUNITY MIGHT TAKE, AND FACILITIES REQUIRED, TO ABATE COMBINED SEWER OVERFLOWS ADVERSELY AFFECTING AN URBAN LAKE. DATA REQUIREMENTS FOR THIS PROJECT WILL BE TAKEN ENTIRELY FROM OTHER PROJECTS EITHER COMPLETED OR IN PROGRESS. EXISTING INFORMATION WILL BE REVIEWED FROM THOSE AREAS THAT HAVE DEFINED THE CHARACTERISTICS OF THEIR COMBINED SEWER OVERFLOWS AS WELL AS THE IMPACT OF THESE DISCHARGES ON RECEIVING WATERS. A GROUP OF "TEST" DATA WILL BE SELECTED FROM INFORMATION REVIEWED AND USED TO ILLUSTRATE THE STEP BY STEP PROCEDURE IN DETERMINING THE RELATIVE SIGNIFICANCE OF COMBINED SEWER OVERFLOWS WITH RESPECT TO ENVIRONMENTAL IMPACT. THE METHODOLOGY WILL ESSENTIALLY ADDRESS MUNICIPAL/INDUSTRIAL DISCHARGES, NON-POINT SOURCE RUNOFF, AND COMBINED SEWER OVERFLOW DISCHARGES, AND SHOW THEIR RELATIONSHIP WITH RESPECT TO ENVIRONMENTAL IMPACT, FROM WHICH OVERFLOW CRITERIA CAN BE DERIVED.

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IDENTIFY AND QUANTIFY FACTORS AFFECTING POTW SYSTEM, SUBSYSTEM AND
PROCESS RELIABILITY
   START/ COMPL DATE :    02/77 - 04/79 : FUNDING : EST. - FY   77  / $   74990
    TASK/EPA CODE :C611B-7121   / R805097-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : J H  BENDER
   INVESTIGATORS :   E D SCHROEDER                  UNIV. OF CALIFORNIA
                     G   TCHOBANOGLOUS              UNIV. OF CALIFORNIA
   MILE: 02/77 -FUND
         02/77 -PROJECT START
         04/78 -INTERIM REPORT
         04/79 -PROJECT COMPLETE
         10/79 -REPORT AVAILABLE DATE
    THE OBJECTIVES OF THIS PROJECT ARE TO STUDY BIOLOGICAL TREATMENT RELI
    ABILITY IN THREE STEPS. THE FIRST STEP CONSISTS OF COLLECTING AND STATISTI
    CALLY ANALYZING OPERATIONAL AND PERFORMANCE DATA FROM APPROXIMATELY 200 BI
    OLOGICAL WASTEWATER TREATMENT PLANTS OF VARIOUS TYPES HAVING FLOWS RANGING
    FROM 0.1 TO 100 MGD. VARIOUS EVALUATION PARAMETERS SHALL BE USED SO AS TO
    ACCURATELY RELATE VARIABILITY OF PLANT PERFORMANCE TO CAUSATIVE DESIGN
    AND OPERATIONAL FACTORS. THE SECOND STEP CONSISTS OF PERFORMING A
    THEORETICAL ANALYSIS OF THE INHERENT RELATIVE STABILITY/RELIABILITY OF THE
    BIOMASS TO WITHSTAND EXTREME LOADING RATE CHANGES, TEMPERATURE EFFECTS,
    TOXIC OR INHIBITORY SUBSTANCES AND OTHER COMMONLY RECOGNIZED STRESS
    FACTORS THAT AFFECT PHYSIOLOGICAL RESPONSES AND SYSTEM PERFORMANCE.
    THE THIRD STEP CONSISTS OF SELECTING FULL-SCALE PLANTS, PILOT PLANTS OR
    LABORATORY STUDIES APPROPRIATE FOR EVALUATING AND VERIFYING THE
    STABILITY/RELIABILITY RELATIONSHIP DEVELOPED.
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QUANTITY QUALITY SIMULATION (QQS) - A DETAILED SIMULATION FOR URBAN RUNOFF CONTROL

START/ COMPL DATE : 00/00 - 00/00 : FUNDING : EST. - FY 77 / $ 16500
TASK/EPA CODE :C611A-7100 / R805100-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : R FIELD
INVESTIGATORS : W F GEIGER DORSCH CONSULT LIMITED
MILE: 09/77 -GRANT AWARD
10/76 -FINAL REPORT PUBLISHED

THE METHODOLOGY AND APPLICATION OF THE QUANTITY-QUALITY-SIMULATION MODEL (QQS) WILL BE REPORTED. THIS METHOD IS A MATHEMATICAL SIMULATION MODEL TO SHOW AND TO PREDICT THE EFFECT OF THE INTERMITTENT LOADINGS OF COMBINED AND STORM SEWER SYSTEMS ON RECEIVING WATERS. ON BEHALF OF THE RANDOM NATURE OF THE PROCESS GOVERNING URBAN RUNOFF POLLUTION, THE MODEL ALLOWS FOR CONTINUOUS SIMULATION AND SUBSEQUENT STATISTICAL ANALYSIS OF SEWER OVERFLOW PROPERTIES SUCH AS DURATION OF OVERFLOWS, TOTAL OVERFLOWING VOLUME, PEAK AND AVERAGE OVERFLOWING RATES AS WELL AS THEIR POLLUTANT LOADS OR CONCENTRATIONS. BOD, TOTAL SUSPENDED SOLIDS, SETTABLE SOLIDS AND FECAL COLIFORM WERE SIMULATED TO DATE, PRESENTLY COD, HEAVY METALS, PHOSPHORUS, CHLORIDE AND NUTRIENTS ARE INVESTIGATED. HOWEVER, THE MODEL CAN HANDLE ANY CONSERVATION POLLUTANT. THE COMPLETE PROGRAM PACKAGE CONSISTS OF 30,000 STATEMENTS WRITTEN IN STANDARD FORTRAN IV ALLOWING COMPUTATIONS ON BATCH PROCESSING SYSTEMS WITH FORTRAN IV COMPILERS. THE METHOD IS FULLY DEVELOPED, TESTED ON EIGHT DIFFERENT CATCHMENTS AND APPLIED TO TWO LARGE SCALE PROJECTS SHOWING THE IMPACT ON RECEIVING WATERS OF THE COMBINED SEWER SYSTEMS OF THE CITY OF ROCHESTER, N.Y., U.S.A., AND THE CITY OF AUGSBURG, GERMANY. APPLICATIONS TO THE SEWER SYSTEMS OF THE CITIES OF VANCOUVER, B.C., CANADA, AND MUNICH, GERMANY, ARE UNDER WAY.

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COREHOLE SPACING MODELS DEFINING POTENTIAL TOXIC ROCK BODIES IN COAL
SURFACE MINING
  START/ COMPL DATE :    02/77 - 02/79 : FUNDING : EST. - FY   77  / $  109000
   TASK/EPA CODE :86238-503     / R805101-01   (GRANT)  PRIOR  FY76 /          1
  PROJECT OFFICER : T G  NEWPORT
  INVESTIGATORS :    J C HORNE                        UNIV. OF SOUTH CAROLINA
                     J C FERM                         UNIV. OF SOUTH CAROLINA
  MILE: 01/77 -FUNDING PACKAGE SUBMITTED
        02/77 -AWARD FUNDS FOR PROJECT
        10/78 -FINAL DRAFT REPORT
        02/79 -FINAL REPORT
        03/79 -FINAL REPORT RECEIVED
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WITH THE RECENT INCREASE IN STRIP MINING AND THE IMPENDING PASSAGE OF FEDERAL SURFACE MINING LEGISLATION, IT IS IMPERATIVE THAT A COREHOLE SPACING PROGRAM BE DEVELOPED THAT DEFINES THE POTENTIALLY TOXIC SPOIL MATERIALS IN ADVANCE OF SURFACE MINING. ONE OF THE PRODUCTS OF CURRENT RESEARCH IS A COLOR PHOTOGRAPHIC BOOK ILLUSTRATING 28 OF THE STANDARD ROCK TYPES FOUND IN THE COAL MEASURES OF EASTERN KENTUCKY AND SOUTHERN WEST VIRGINIA. BY ASSOCIATING THESE ROCK TYPES WITH THEIR GEOCHEMICAL AND WEATHERING CHARACTERISTICS, THE TOXICITY POTENTIAL OF EACH LITHOLOGY WAS APPRAISED, AND POTENTIAL PROBLEM ROCK TYPES WERE ISOLATED. USING THESE RESULTS AS A BASE, IT IS PROPOSED TO DETERMINE THE SHAPE, THICKNESS, AND LATERAL EXTENT OF THE POTENTIALLY TOXIC ROCK TYPES WITH THE VIEW THAT, IF DIMENSIONS OF SOME OF THESE ROCK BODIES ARE KNOWN, CORE HOLE SPACING REQUIRED TO DELINEATE THE DIMENSIONS OF OTHER SIMILAR BODIES CAN BE DETERMINED. KNOWLEDGE OF THIS TYPE WILL AID IN THE PLANNING FOR HYDRAULIC MANIPULATIONS AND SEGREGATION AND BURIAL OF POTENTIALLY TOXIC MATERIALS DURING OVERBURDEN HANDLING IN SURFACE MINES. THE DATA BASE FOR THE PROPOSED STUDY INCLUDE DETAILED (20' EQUALS 1" VERTICAL, .1 MILE EQUALS 1" HORIZONTAL) GEOLOGIC CROSS SECTIONS OF MORE THAN 400 MILES OF PRE-SPLIT HIGHWAY EXPOSURES AND OVER 5000 COREHOLE RECORDS IN EASTERN KENTUCKY AND SOUTHERN WEST VIRGINIA. BY COMPARING THE ROCKS FOUND TO BE POTENTIALLY TOXIC IN THE CORE BOOK EXPERIMENT WITH THOSE FOUND IN THE HIGHWAY CUTS AND ADJOINING BORE HOLES IN THE DIMENSIONS OF THE POTENTIALLY PROBLEM ROCKS CAN BE DELINEATED. THE TOXICITY OF THESE ROCK TYPES WILL BE ANALYZED TO DETERMINE THE TYPE AND AMOUNT OF PYRITE AND THE ACIDITY, ALKALINITY, SULFATE CALCIUM, MAGNESIUM ALUMINUM AND IRON CONTENTS OF EFFLUENTS LEACHED FROM THEM. FROM THESE DATA, MODELS WILL BE DEVELOPED TO EVALUATE THE IDEAL CORE HOLE SPACING IN ADVANCE OF MINING THAT IS NECESSARY TO DELINEATE POTENTIALLY TOXIC LITHOLOGIES.

II-327

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PARASITIC CONTAMINATION OF WASTE SLUDGES AND TREATMENT ALTERNATIVES

     START/ COMPL DATE :    04/77 - 07/78 : FUNDING : EST. - FY   77  / $   44173
      TASK/EPA CODE :D607A-011    / R805107      (GRANT)  PRIOR  FY   /          1
     PROJECT OFFICER : H R  PAHREN
     INVESTIGATORS :    R S REIMERS                       TULANE UNIVERSITY OF LOUISIAN
                        N D LITTLE                        TULANE UNIVERSITY OF LOUISIAN
                        A J ENGLANDE                      TULANE UNIVERSITY OF LOUISIAN
                        J W MASON                         TULANE UNIVERSITY OF LOUISIAN
                        P C BEAVER                        TULANE UNIVERSITY OF LOUISIAN
     MILE: 07/78 -COMPLETE STUDIES
       THIS INVESTIGATION IS TO SURVEY MUNICIPAL WASTE SLUDGES FROM THE S
       OUTHEASTERN STATES FOR POSSIBLE CONTAMINATION. THE CHOICE OF THE SOUTHEAST
       REGION IS PREDICATED ON THE EXPECTED PREVALENCE OF PARASITES. THE AIM OF
        THE PROPOSED SURVEY IS THREE-FOLD: (1) TO ASSESS PROBLEMS WHICH COULD R
       ESULT FROM PARASITIC CONTAMINATION IN THE DISPOSITION OF MUNICIPAL WASTE S
       LUDGE (PRIMARILY WITH SECONDARY OR BIOLOGICAL SLUDGES), (2) TO INVESTIGATE
       THE EFFECTIVENESS OF LIME STABILIZATION IN THE INHIBITION OF P
       ARASITES, AND (3) TO STUDY POSSIBLE WASTE WATER AND SLUDGE TREATMENT TECHN
       IQUES ON DESTRUCTION AND INHIBITION OF PARASITES IN MUNICIPAL SLUDGES. THE
        STUDY WILL AID IN EVALUATING PARASITIC CONTAMINATION OF MUNICIPAL S
       LUDGES IN THE SOUTHEASTERN UNITED STATES. THE SECOND PORTION OF THIS STUDY
        WILL INVESTIGATE VARIOUS TECHNIQUES AND PROCESSES ON THE REDUCTION OF
       PARASITES IN SLUDGES. RESULTS OF THIS INVESTIGATION SHOULD BE USEFUL IN
       DELINEATING FURTHER AREAS OF NEEDED RESEARCH.
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II-328

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STORM AND COMBINED SEWER STORAGE - TREATMENT THEORY COMPARED TO COMPUTER
 SIMULATION
   START/ COMPL DATE :    00/00 - 00/00 : FUNDING : EST. - FY   77  / $    6000
    TASK/EPA CODE :C611A-7101    / R805109       (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : A N  TAFURI
   INVESTIGATORS :    C D HOWARD                     CHARLES HOWARD & ASSOC. LTD.
                      W C HUBER                      STATE UNIVERSITY OF FLA. SYS.
                      J P HEANEY                     STATE UNIVERSITY OF FLA. SYS.
   MILE: 09/77 -START PROJECT
         09/77 -FINAL REPORT PUBLISHED
     THE OBJECTIVES ARE TO DEMONSTRATE AND FURTHER DEVELOP A MATHEMATICAL D
     ESK-TOP METHOD FOR DESCRIBING HOW RUNOFF MAY BE CONTROLLED AND POLLUTION M
     INIMIZED THROUGH ECONOMICALLY OPTIMUM COMBINATIONS OF STORAGE CAPACITY AND
     TREATMENT FACILITIES. THE WORK WILL PROVIDE A DIRECT COMPARISON WITH THE
      COMPUTER SIMULATION ASPECTS OF "STORM WATER MANAGEMENT MODEL: LEVEL I
      - PRELIMINARY SCREENING PROCEDURES, EPA-600/2-76-275, OCTOBER,
     1976", AND THE STATISTICAL ASPECTS OF "AREAWIDE ASSESSMENT PROCEDURES MANU
     AL, EPA-600/9-76-014, JULY, 1976". THE WORK WILL INCLUDE STEPS TO MAKE THE
      MATHEMATICAL METHOD MORE EASILY USABLE IN PRACTICE, IDENTI
     FICATION OF RAINFALL PARAMETERS FOR SEVERAL MAJOR CITIES AND COMPARISON OF
     MATHEMATICAL RESULTS WITH EXISTING COMPUTER SIMULATIONS. THE BASIS FOR THE
      APPROACH IS "THEORY OF STORAGE-TREATMENT PLANT OVERFLOWS, BY C.D.D.
     HOWARD, JN HYD DIV., ASCE, AUG., 1976."
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II-329

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WATER SOURCE AND CHARACTERISTICS AND MALIGNANCY RATES OF SELECTED SITES
IN SELECTED PARISHES IN LOUISIANA
    START/ COMPL DATE :    00/00 - 00/00 : FUNDING : EST. - FY   77  / $      0
     TASK/EPA CODE :D6148-116    / R805110-01  (GRANT)  PRIOR  FY   /          1
    PROJECT OFFICER : K    CANTOR
    INVESTIGATORS :     M S GOTTLIEB                    TULANE UNIVERSITY OF LOUISIAN
                        F J MATHER                      TULANE UNIVERSITY OF LOUISIAN
   MILE: 05/78 -REPORT
     TO EXAMINE THE POSSIBLE RELATIONSHIP OF THE SOURCE OF DRINKING WATER IN
     SELECTED LOUISIANA PARISHES TO THE OCCURRENCE OF CANCER OF SITES WHICH
     APPEAR TO BE SIGNIFICANTLY ELEVATED AND PARTICULARLY FOR CANCER OF THE PAN
     CREAS, STOMACH, BLADDER, LUNG AND COLON CANCER, EXCLUDING RECTUM. PARISHES
     HAVE BEEN SELECTED BY SOURCE OF DRINKING WATER AND OTHER ENVIRONMENTAL CH
     ARACTERISTICS. TO DATE RELATED STUDIES HAVE PRIMARILY CONCERNED THEMSELVES
      WITH MORTALITY DATA. MORTALITY DATA DOES NOT DISTINGUISH BE
     TWEEN INCIDENCE AND PREVALENCE. THIS IS PARTICULARLY CRITICAL WHEN LOOKING
     FOR ETIOLOGY OF CANCERS WITH LONG SURVIVAL FROM TIME OF DIAGNOSIS,
     IE. BLADDER AND LARGE INTESTINE (COLON). IN THE FIRST PHASE MORTALITY
     RATES FOR THE SELECTED MALIGNANCIES WILL BE COMPARED FOR THREE TIME
     PERIODS FOR THE SELECTED PARISHES. THIS PROJECT WILL SYSTEMATICALLY USE
     MORTALITY DATA TO MEASURE INCIDENCE WHERE APPLICABLE (CANCER OF THE LUNG,
     PANCREAS AND STOMACH). ALSO, BY COMPARING SELECTED HOSPITAL DATA
     FOR CANCERS WITH SHORT SURVIVALS DETERMINE THE REPRESENTATIVENESS OF THE H
     OSPITAL DATA OF THE TOTAL MORTALITY AND DETERMINE THE USEFULNESS OF INCIDE
     NCE DATA (DATE OF DIAGNOSIS) FROM THESE HOSPITALS FOR CANCERS OF THE LARGE
     INTESTINE AND BLADDER. THE NULL HYPOTHESIS IS THAT DRINKING WATER SOURCE
     HAS NOTHING TO DO WITH CANCER RATES. ORLEANS PARISH IS ONE OF THE PARIS
     HES THAT WILL BE CONSIDERED. OTHER VARIABLES THAT WILL THEN BE EXAMINED TO
      LOOK AT DIFFERNCES IN RATES NOT ATTRIBUTABLE TO DRINKING WATER ARE THE
     PRESENCE OF PARTICULAR INDUSTRIES, AND THE PROXIMITY OF THE RESIDENCE
     OF THE CASES TO THE INDUSTRY, AS WELL AS PARTICULAR OCCUPATIONS.
     MORTALITY OR INCIDENCE RATES FOR THE SPECIFIC SUBGROUPS WILL BE CALCULATED
     AND COMPARED TO EXPECTED NUMBERS (EXPECTED DEATHS BASED ON AGE-TIME
     SPECIFIC DEATH RATES FOR LOUISIANA RESIDENTS, AND INCIDENCE RATES BASED O
     N THE NATIONAL CANCER INCIDENCE SURVEYS MOST APPROPRIATE TO THE PARTICULAR
      YEARS BEING CONSIDERED). STANDARDIZED RATIOS WILL BE CALCULATED IN
     ORDER TO COMPARE GROUPS AND SUB-GROUPS.
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The fundamental objective of the burn tests is to develop data that may be translated into design criteria for the fabrication of equipment to be used for the incineration of kepone and kepone contaminated waste. The activities required to fulfill the objective are indicated below:

.determine the time/temperature relationship of the incineration process in order to destroy kepone and its hazardous by-products.

.develop the thermal requirements for complete decontamination of waste products containing kepone

,to substantiate the findings by D.S. Duvall and W.A. Rubey in their technical report entitled "Laboratory Evaluation of High Temperature Destruction of Kepone and Related Pesticides." This work was done under flameless conditions.

Technical grade kepone in concentrated form will be transported to Toledo, Ohio, to be burned in the research facilities of Surface Division, Midland-Ross Corp. This equipment includes a high temperature afterburner capable of reaching temperatures in access of 2600 degrees F and a rotary kiln continuous feed or batch feed unit. Analysis will be made of off-gases, scrubber liquor, air samples taken within the test facility and outside of the building, wash water and any other materials subject to contamination. The initial runs are designed so that if no conbustion takes place, the emission of stack temperature will not exceed 1 x 10^{-6} gms/m^3 which will result in an ambient air concentration of less than 2.5 x 10^{-8} gms/m^3.

II-331

EFFECTS OF OZONE ON DNA REPAIR SYNTHESIS IN RABBIT LYMPHOCYTES

START/ COMPL DATE : 10/77 - 08/79 : FUNDING : EST. - FY 77 / $ 47000
TASK/EPA CODE :H601C-7298 / R805114-01 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : P HU
INVESTIGATORS : S G CHANEY UNIV. OF NORTH CAROLINA
MILE: 03/78 -OPTIMIZE ALL THE TECHNIQUES INVOLVED IN THE MEASUREMENTS OF DNA
11/78 -COMPLETION OF THE DOSE-RESPONSE CURVE
03/79 -COMPLETION OF THE TIME COURSE STUDY. INITIATE STUDIES ON THE M
08/79 -COMPLETION OF THE PROPOSED RESEARCH

THE OBJECTIVES OF THIS WORK ARE THREE (3) FOLD: 1) TO DETERMINE A DOSE RESPONSE CURVE FOR THE AMOUNT OF DNA REPAIR SYNTHESIS INDUCED BY A VARIOUS DOSES OF OZONE, 2) TO DETERMINE WHETHER THAT REPAIR IS "SHORT PATCH" OR "LONG PATCH" REPAIR, AND 3) TO DETERMINE WHETHER THE EFFECTS OF OZONE ON DNA REPAIR IN VIVO CAN BE MIMICKED BY OZONIDES OR PEROXIDES IN VITRO. THESE EXPERIMENTS WILL BE CARRIED OUT BY EXPOSING RABBITS TO VARYING LEVELS OF OZONE, RAPIDLY ISOLATING A MIXED LEUKOCYTE POPULATION BY DIFFERENTIAL CENTRIFUGATION, AND MEASURING DNA REPAIR SYNTHESIS IN THE CULTURED CELLS.

II-332

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PREDICTING ACID POLLUTION POTENTIAL FROM COAL STRIP MINES
  START/ COMPL DATE :    04/77 - 02/79 : FUNDING : EST. - FY   77  / $   86000
   TASK/EPA CODE :1B623B-606    / R805116-01  (GRANT)  PRIOR  FY76 /         1
  PROJECT OFFICER : T G  NEWPORT
  INVESTIGATORS :   F T CARUCCIO                         UNIV. OF SOUTH CAROLINA
  MILE: 04/77 -FUNDING PACKAGE SUBMITTED
        05/77 -AWARD FUNDS FOR PROJECT
        02/79 -FINAL REPORT
    IF AN ACIDITY INDEX CAN BE DEVELOPED WITH A REASONABLE DEGREE OF PRECISIO
  N, THE INFORMATION WILL BE VERY VALUABLE TO MINING OPERATORS AND REGULATOR
  Y OFFICIALS IN THAT THEY WILL HAVE A TOTAL WHICH CAN BE USED TO ACCURATELY
   PREDICT THE AMOUNT OF ACID POLLUTION TO BE EXPECTED FROM A SITE PROPOSED
  FOR SURFACE MINING. THIS WILL BE USEFUL IN DETERMINING WHETHER A MINE
  PERMIT SHOULD BE ISSUED AND IN REVIEWING THE PROPOSED MINING OPERATION TO
  SEE IF PROPER RECLAMATION PRACTICES ARE EMPLOYED. SIX PROPOSED STRIP
  MINES UNDERLAIN BY DIFFERENT GEOLOGIES IN THE BITUMINOUS COAL FIELD OF
  WESTERN PENNSYLVANIA WILL BE CORE DRILLED TO PROVIDE FRESH ROCK SAMPLES,
  DETAILED GEOLOGY AND GROUND WATER SAMPLING POINTS. THE ROCKS WILL BE
  RELATED TO THEIR ACID-ALKALINITY PRODUCTION POTENTIALS THROUGH LABORATORY
  SIMULATED WEATHERING CONDITIONS AND PETROGRAPHIC ANALYSES. THE LEACHATES
  WILL BE ANALYZED FOR SPECIFIC IONIC SPECIES INDICATIVE OF PARTICULAR
  CHEMICAL REACTIONS. A REGIONAL AQUEOUS GEOCHEMICAL SURVEY WILL BE COMPL
  ETED TO EVALUATE THE NATURAL SYSTEM'S NEUTRALIZING AND BUFFERING CAPACITIE
  S. DURING THE BACKFILLING PHASE OF MINING OPERATION, WATER COLLECTORS WILL
   BE BURIED IN THE BACKFILL AND MINE DRAINAGE CHARACTERISTICS MONITORED.
   THE CHEMICAL CHARACTERISTICS OF THE MINE DRAINAGE WILL THEN BE RELATED
  TO THOSE OF THE LEACHATE TO ASCERTAIN THE CHEMICAL REACTIONS TAKING PLA
  CE. FURTHER IDENTIFICATION WITH THE PETROGRAPHIC ANALYSES AND PYRITE TYPES
  OF THE ROCKS OCCUPYING THE MINE SITE AND NOTED TO PRODUCE
  PARTICULAR ACID-ALKALINE LOADS, PERMITS THE EXTENSIONS OF THIS POLLUTION
  PREDICTIVE TECHNIQUE TO OTHER AREAS.
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CHARACTERIZATION OF HIGH-TEMPERATURE DECOMPOSITION BEHAVIOR OF
PESTICIDES AND OTHER ORGANIC MATERIALS
   START/ COMPL DATE :    00/00 - 00/00 : FUNDING : EST. - FY   77  / $  100000
    TASK/EPA CODE :C618A-7042   / R805117-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R    CARNES
   INVESTIGATORS :   D S DUVALL                       UNIV. OF DAYTON
                     W A RUBEY                        UNIV. OF DAYTON
                     N L HECHT                        UNIV. OF DAYTON
                     L I BOEHMAN                      UNIV. OF DAYTON
                     B L FOX                          UNIV. OF DAYTON
   MILE: 12/80 -PUBLISH FINAL REPORT
    THE PRIME OBJECTIVE OF THE PROPOSED RESEARCH EFFORT IS TO DETERMINE THE
    THERMAL DESTRUCTION CHARACTERISTICS OF A WIDE ASSORTMENT OF P
    ESTICIDES AND OTHER ORGANIC HAZARDOUS WASTE MATERIALS. THIS OBJECTIVE WILL
    BE ACCOMPLISHED USING A SPECIALLY DESIGNED LABORATORY TEST SYSTEM CAPABLE
    OF DETERMINING DESTRUCTION-TEMPERATURE/RESIDENCE TIME DATA FOR A
    MULTITUDE OF ORGANIC SAMPLES, WHILE SIMULTANEOUSLY ANALYZING THE COMPLETE
    SPECTRUM OF EVOLVED DECOMPOSITION PRODUCTS. THIS SYSTEM WILL BE CAPABLE OF
    "QUICK RESPONSE" GENERATION OF DATA; WILL OPERATE IN EITHER THE FLAME OR
    NONFLAME THERMAL DESTRUCTION MODE; AND WILL INCORPORATE A DEDICATED GC-MS
    FOR ANALYSIS OF EVOLVED PRODUCTS.
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II-334

CONTAMINANT FLUX FROM MARINE SEDIMENTS AND DREDGE SPOIL DEPOSIT

START/ COMPL DATE : 05/77 - 04/80 : FUNDING : EST. - FY 77 / $ 60718
TASK/EPA CODE :P608C-13 / R805129-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : R PAYNE
INVESTIGATORS : M L BENDER UNIV. OF RHODE ISLAND
MILE: 04/80 -FINAL REPORT ENTITLED, "CONTAMINANT FLUX FROM MARINE SEDIMENTS

THE OBJECTIVES OF THE PROPOSED WORK ARE: 1) TO GATHER INFORMATION NEEDED FOR DEVELOPING GUIDELINES FOR DREDGE SPOIL AND SEWAGE SLUDGE DISPOSAL WHICH WILL MINIMIZE THE ENVIRONMENTAL IMPACT OF THESE WASTES WITH REGARD TO HEAVY METAL AND ORGANIC CHEMICAL POLLUTANTS, AND 2) TO DETERMINE CIRCUMSTANCES UNDER WHICH THE POLLUTANT OF SEDIMENTS INHIBITS REGENERATION OF NUTRIENTS. TO THESE ENDS, WE PROPOSE THREE PROJECTS: 1) A STUDY OF BENTHIC FLUXES AND PORE WATER CHEMISTRY ON AND AROUND A DREDGE SPOIL TO ASSESS THE IMPACT OF POLLUTANTS ON PORE WATER CHEMISTRY, METAL RELEASE BY SEDIMENTS, AND NUTRIENT REGENERATION. 2) FURTHER STUDIES OF BENTHIC FLUXES AND PORE WATER CHEMISTRY IN NARRAGANSETT BAY TO UNDERSTAND HOW SEDIMENT POLLUTANT AND CHEMICAL PROPERTIES AFFECT TRACT METAL RELEASE. 3) COMPARISON OF METAL, HYDROCARBON AND PCB CONTENTS OF DREDGE SPOILS AND SURROUNDING SEDIMENTS TO ASSESS THE FEASIBILITY FOR USING METALS AS TRACERS FOR HARD-TO-MEASURE ORGANIC POLLUTANTS.

II-3 35-

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ROTATING DISC BIOLOGICAL TREATMENT OF AMD

    START/ COMPL DATE :    04/77 - 04/78 : FUNDING : EST. - FY   77  / $   63000
     TASK/EPA CODE :B623B-514    / R805132-01  (GRANT)  PRIOR  FY76 /           1
    PROJECT OFFICER : R G  WILMOTH
    INVESTIGATORS :   R F UNZ                          PENN. STATE UNIVERSITY
                      H   OLEM                         PENN. STATE UNIVERSITY
    MILE: 03/77 -FUNDING PACKAGE SUBMITTED
          04/77 -AWARD FUNDS FOR PROJECT
          04/78 -FINAL REPORT RECEIVED
      THE PROJECT IS CONCERNED WITH EVALUATING THE FERROUS (FEII) IRON OXIDIZING
       CAPACITY OF THE ROTATING BIOLOGICAL CONTACTOR IN THE TREATMENT OF ACID
      MINE DRAINAGE. THE PROCESS IS DEPENDENT UPON THE LITHOTROPHIC CAPACITY
       OF IRON-OXIDIZING BACTERIA WHICH COLONIZE THE AVAILABLE SURFACE AREA OF
       ROTATING DISCS IMMERSED IN ACID MINE WATER FLOWING THROUGH THE RBC
      UNIT. THE OXIDATION OF THE FERROUS IRON TO THE FERRIC STATE REDUCES
      THE POLLUTION POTENTIAL OF THE DRAINAGE. THE SPECIFIC OBJECTIVES OF THE
       PROJECT ARE TO DETERMINE THE TREATMENT OF MINE DRAINAGES OF DIFFERING
      CHEMICAL NATURE AND THE REQUIREMENTS FOR TREATMENT OF CERTAIN SPECIFIC
      DRAINAGES BY THE UNIT TO ACCOMPLISH DESIRED EFFLUENT QUALITY. A FULL SIZE
      RBC TREATMENT UNIT, WITH 2 METER DIAMETER DISCS, WILL BE SPECIALLY
      MODIFIED FOR DEMONSTRATION PURPOSES AND OPERATED AT THREE FERROUS IRON-CO
      NTAINING ACID MINE DRAINAGE LOCATIONS. THESE LOCATIONS ARE IN PENNSYLVANIA
      AND WEST VIRGINIA AND INCLUDE ONE ACTIVE AND TWO ABANDONED COAL
      MINES. PERTINENT WATER QUALITY PARAMETERS WILL BE ANALYZED TO DETERMINE
       THE EFFECTIVENESS OF THE UNIT. PARTICULAR ATTENTION WILL BE PAID TO THE
      POPULATION DYNAMICS OF THE IRON OXIDIZING ORGANISMS AT VARIOUS
      STAGES OF TREATMENT. ANALYTICAL DATA WILL BE UTILIZED TO AID IN THE DESIGN
      OF OTHERS UNITS AND THE ASSESSMENT OF CAPITAL AND OPERATING COSTS.
      ECONOMICS OF THE UNIT WILL BE COMPARED TO THOSE OF OTHER IRON OXIDIZING
      PROCESSES IN USE OR PLANNED.
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II-336

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A SHORT COURSE ON THE APPLICATION OF COMPUTER PROGRAMS IN PRELIMINARY
DESIGN OF WASTEWATER TREATMENT FACILITIES
   START/ COMPL DATE :    05/77 - 05/78 : FUNDING : EST. - FY   77  / $   30678
    TASK/EPA CODE :C619A-7110    / R805134-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R G  EILERS
   INVESTIGATORS :    J W MALE                              ILLINOIS INST. OF TECHNOLOGY
                      S   GRAEF                             ILLINOIS INST. OF TECHNOLOGY
   MILE: 08/77 -WORKSHOP WAS HELD AND A USER'S MANUAL WAS COMPLETED
     THE OBJECTIVE OF THE SHORT COURSE WILL BE TO FAMILIARIZE THE PARTICIPANTS
    WITH THE CONCEPTS OF PRELIMINARY TREATMENT PLANT DESIGN BY DIGITAL
    COMPUTER AND PROVIDE HANDS ON EXPERIENCE IN APPLYING EXISTING COMPUTER
    PROGRAMS FOR RESOLVING WASTEWATER FACILITY PLANNING, DESIGN AND SIMULATION
     PROBLEMS. THE PRINCIPAL COMPUTATIONAL BASIS OF THE WORKSHOP WILL BE
    THE CURRENT USEPA EXECUTIVE PROGRAMS FOR THE PRELIMINARY DESIGN OF
    WASTEWATER TREATMENT FACILITIES DEVELOPED BY EILERS AND SMITH. P
    ARTICIPANTS ARE ANTICIPATED FROM CONSULTING FIRMS, REGULATORY AGENCIES AND
    MUNICIPAL OPERATING AGENCIES HAVING SPECIAL INTEREST IN QUANTITATIVE
    COST/PERFORMANCE COMPARISONS AMONG MULTIPLE TREATMENT FACILITY DESIGNS. A
    FIVE-DAY WORKSHOP IS SCHEDULED AT THE ILLINOIS INSTITUTE OF TECHNOLOGY F
    OR MARCH 1977. GUEST SPEAKERS, FROM CONSULTING FIRMS, REGULATORY AGENCIES,
    ACADEMIA AND OPERATING AGENCIES, EXPERIENCED IN THE APPLICATION OF THE
    EILERS-SMITH PROGRAM TO ENGINEERING PROBLEMS, WILL PRESENT SEMINAR TYPE
     LECTURES. EACH LECTURER WILL PRESENT AN EXAMPLE OF HOW HE HAS USED THE
    USEPA PROGRAMS TO SOLVE AN ENGINEERING PROBLEM AND THEN OUTLINE AN ABB
    REVIATED ANALOGOUS PROBLEM FOR THE PARTICIPANTS TO SOLVE. THE LECTURER AND
    THE ENTIRE STAFF WILL ASSIST THE PARTICIPANTS WITH EACH PROBLEM
    AND THEN CRITIQUE THE SOLUTION. A DETAILED USER'S GUIDE WHICH IDEN
    TIFIED AND SIMPLIFIES THE INPUT, OUTPUT AND COST/PERFORMANCE RELATIONSHIPS
    IN EACH EXEC PROGRAM PROCESS SUBROUTINE IS BEING PREPARED. THIS WILL ENA
    BLE THE PARTICIPANTS TO UNDERSTAND AND JUSTIFY THE ANSWERS PRODUCED BY THE
     EXEC PROGRAMS. A SET OF NOTES ACCOMPANIED BY THE WORKED OUT EXAMPLES BY T
    HE LECTURERS WILL BE DISTRIBUTED WITH THE USER'S GUIDE TO EACH PARTICIPANT
     PRIOR TO THE WORKSHOP. FURTHERMORE, ONE OF THE LECTURES PRESENTED WILL
    DISCUSS THE STEPS FOR ADDING THE USEPA PROGRAMS TO THE PARTICIPANTS' HOME
    COMPUTER FACILITY (IN-HOUSE OR TIME-SHARED TERMINAL).
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II-337

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INFLUENCE OF PARTICULATE PHYSICO-CHEMICAL CHARACTERISTICS ON PULMONARY
CELL SYSTEMS
   START/ COMPL DATE :    10/76 - 10/79 : FUNDING : EST. - FY   77  / $  165000
    TASK/EPA CODE :H601D-7317   / R805141     (GRANT)  PRIOR  FY76 /           1
   PROJECT OFFICER : D E  GARDNER
   INVESTIGATORS :   C    ARANYI
                     D E GARDNER                    I I T RESEARCH INSTITUTE
                     J L HUISINGH                   U.S. ENVIRON. PROTECTION AGCY
   MILE: 03/77 -AWARD GRANT                         I I T RESEARCH INSTITUTE
         05/77 -INITIATE WORK
         11/77 -PRIMARY SCREENING OF PARTICLES
         05/78 -SECONDARY SCREENING OF PARTICLES
         03/78 -ANNUAL REPORT
         08/78 -AEROSOL METHODOLOGY ESTABLISHED
         03/79 -ANNUAL REPORT
         10/79 -IN VIVO EXPOSURES FOR MACROPHAGE STUDIES COMPLETED
         03/80 -INFECTIVITY STUDIES COMPLETED
         06/80 -FINAL REPORT
     THE PURPOSE OF THIS PROJECT WILL BE TO DETERMINE THE COMPARATIVE TOXICITY
     OF PARTICULATES TO MACROPHAGES WHEN EXPOSED IN VITRO AND IN VIVO.
     CHEMICALLY CHARACTERIZED CRUDE PARTICULATES FROM INDUSTRIAL PROCESSES
     OF RESPIRABLE SIZE AND OTHER PARTICULATE SAMPLES WILL INITIALLY BE
     SCREENED FOR RELATIVE CYTOTOXICITY TO THE ALVEOLAR MACROPHAGE EXPOSED IN
     VITRO.FROM THIS INITIAL SCREENING IN VITRO, PARTICULATE SAMPLES OF HIGH,
     MODERATE AND LOW TOXICITY WILL BE SELECTED FOR IN VIVO INHALATION EXPOSU
     RES. MACROPHAGES ISOLATED FROM THESE EXPOSED ANIMALS WILL THEN BE EXAMINED
      FOR A NUMBER OF PARAMETERS INCLUDING TOTAL NUMBERS, VIABILITY, ATP
     CONTENT, PHAGOCYTIC ABILITY, AND BACTERIOCIDAL ACTIVITY. RESULTS FROM IN
      VIVO EXPOSURES WILL BE CORRELATED WITH RESULTS FROM STRICTLY IN
     VITRO EXPOSURES IN ORDER TO VALIDATE IN VITRO FINDINGS. FURTHERMORE, IN V
     IVO STUDIES, WHEN WARRANTED, WILL EXAMINE THE EFFECT OF THESE PARTICULATES
      ON ANIMALS SUBSEQUENTLY CHALLENGED WITH A BACTERIAL INFECTION.
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II-338

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SYNOPTIC METEOROLOGY AND AIR QUALITY PATTERNS IN THE ST. LOUIS RAPS
PROGRAM
   START/ COMPL DATE :    04/77 - 04/78 : FUNDING : EST. - FY   77  / $   15442
    TASK/EPA CODE :G603A-AD-09  / R805142-01  (GRANT)  PRIOR  FY   /           1
   PROJECT OFFICER : T    KASL
   INVESTIGATORS :   E   ROBINSON                  WASHINGTON STATE UNIVERSITY
   MILE: 12/77 -REPORT ON SYNOPTIC WEATHER TYPING OF THE WEATHER PATTERNS I
         05/78 -RPT. ON RELATIONSHIP OF AIR QUALITY AND WEATHER TYPES
         05/80 -FINAL REPORT
    THIS RESEARCH PROGRAM HAS 2 OBJECTIVES: (1) TO DEVELOP AN OBJECTIVE CLA
    SSIFICATION SYSTEM FOR THE SYNOPTIC WEATHER PATTERNS THAT AFFECT THE ST. L
    OUIS, MISSOURI AREA; AND (2) TO DETERMINE GENERAL OR AVERAGE AIR QUALITY P
    ATTERNS USING THE RAPS DATA FILE FOR ST. LOUIS AS A FUNCTION OF PREVAILING
     SYNOPTIC WEATHER AS IDENTIFIED IN THE PATTERN CLASSIFICATION STUDY.
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METABOLISM OF CARBAMATE INSECTICIDES

START/ COMPL DATE : 06/77 - 05/82 : FUNDING : EST. - FY 77 / $ 64845
TASK/EPA CODE :H615F-7623 / R805143-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : M D JACKSON
INVESTIGATORS : H W DOROUGH UNIV. OF KENTUCKY

IN VIVO AND IN VITRO METABOLISM EXPERIMENTS WILL BE CONDUCTED WITH CARBAMATE INSECTICIDES IN BOTH ANIMAL AND PLANT SYSTEMS. COMPOUNDS SELECTED WILL BE THOSE ALREADY IN USE HAVING SPECIFIC METABOLISM PROBLEMS STILL EVIDENT, AND NEW PRODUCTS OF HIGH COMMERCIAL POTENTIAL AND/OR OF UNUSUAL CHEMICAL CONFIGURATION. METABOLITES WILL BE ISOLATED, IDENTIFIED WHENEVER POSSIBLE, AND SUBJECTED TO STUDIES DESIGNED TO ESTIMATE THEIR TOXICOLOGICAL SIGNIFICANCE. THESE LATTER STUDIES WILL INCLUDE DETERMINATIONS OF ACUTE TOXICITY TO RATS/MICE, ANTICHOLINESTERASE ACTIVITY, BIOAVAILABILITY AND FATE IN ANIMALS, AND MUTAGENIC/CARCINOGENIC POTENTIAL AS INDICATED BY BACTERIAL ASSAY SYSTEMS. OTHER STUDIES WILL BE UNDERTAKEN TO DETERMINE FACTORS WHICH SIGNIFICANTLY ALTER AN ANIMAL'S ABILITY TO DEGRADE CARBAMATE TOXICANTS. PLANS ARE TO EVALUATE EFFECTS OF OTHER CHEMICALS, DIET, AND VARIOUS FORMS OF STRESS.

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TRACE AND POTENTIALLY TOXIC ELEMENTS ASSOCIATED WITH URANIUM DEPOSITS IN
 SOUTH TEXAS
   START/ COMPL DATE :    05/77 - 05/78 : FUNDING : EST. - FY   77  / $   60000
    TASK/EPA CODE :86238-523    / R805147-01  (GRANT)  PRIOR  FY76 /          1
   PROJECT OFFICER : S J  HUBBARD
   INVESTIGATORS :    C D HENRY                      UNIV. OF TEXAS
                      C G GROAT                      UNIV. OF TEXAS
   MILE: 04/77 -FUNDING PACKAGE SUBMITTED
         05/77 -AWARD FUNDS
         07/78 -FINAL REPORT RECEIVED
     THE OBJECTIVE OF THIS STUDY IS TO EVALUATE POTENTIAL PROBLEMS OF TOXIC
     ELEMENTS ASSOCIATED WITH URANIUM MINERALIZATION AND MINING IN SOUTH
     TEXAS. SAMPLING OF SOILS AND VEGETATION IN (1) AREAS THAT ARE WITHIN OR
     IMMEDIATELY ADJACENT TO MINING AREAS OR HAVE HAD ORE STORED ON THEM; (2)
     AREAS UNDERLAIN BY IDENTIFIED URANIUM MINERALIZATION BUT WHICH HAVE NOT
     BEEN MINED; AND (3) AREAS OF SIMILAR SUBSTRATE AND SOILS AWAY FROM ANY
     KNOWN MINERALIZATION OR PREVIOUS MINING WILL ACCOMPLISH THIS OBJECTIVE.
     THE THIRD LOCALITY WILL ESTABLISH BACKGROUND LEVELS; THE FIRST TWO WOULD
     INDICATE THE EXTENT OF MAN-CAUSED OR "NATURAL" CONTAMINATION. SAMPLING
     WILL BEGIN EARLY IN 1977.
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II-341

PREVENTING HALOFORM FORMATION IN DRINKING WATER

START/ COMPL DATE : 00/00 - 00/00 : FUNDING : EST. - FY 77 / $ 74999
TASK/EPA CODE :C614A-7162 / R805149-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : D T LOVE
INVESTIGATORS : L L HARMS SOUTH DAKOTA SCHOOL OF MINES
R W LODVENGA SOUTH DAKOTA SCHOOL OF MINES
MILE: 05/77 -AWARD GRANT
08/77 -IDENTIFY SOURCES CONTRIBUTING TRIHALOMETHANE PRECURSOR(S) IN JA
02/78 -COMPLETE STUDIES ON COMBINED CHLORINE
08/78 -FINAL REPORT

THE OBJECTIVES OF THE PROPOSED STUDY ARE TO (1) STUDY THE USE OF CHLORAMINES AS A DISINFECTANT ON A FULL-SCALE WATER TREATMENT PROCESS IN ORDER TO REDUCE THE TOTAL HALOFORM CONCENTRATION, (2) ESTABLISH REASONS FOR HALOFORM AFTERGROWTH WITHIN THE DISTRIBUTION SYSTEM, (3) IDENTIFY THE PRIMARY SOURCE OF PRECURSORS, AND (4) SUBSTANTIALLY REDUCE THE BROMODICHLOROMETHANE CONCENTRATION IN THE FINISHED WATER. LABORATORY AND FIELD WORK WILL BE CONDUCTED TO EVALUATE THE DISINFECTION CAPABILITIES OF THE CHLORAMINES IN CONJUNCTION WITH THE REDUCTION OF HALOGENATED HYDROCARBONS. THE TREATMENT PROCESSES AND THE DISTRIBUTION SYSTEM WILL BE MONITORED. VARIATIONS IN RAW WATER QUALITY WILL BE ASSOCIATED WITH POTENTIAL HALOFORM FORMATION IN THE DRINKING WATER. PHYSICAL, CHEMICAL, AND BACTERIOLOGICAL QUALITY WILL BE MONITORED AS WELL AS HYDROLOGIC INFORMATION. SPECIAL ATTENTION WILL BE DIRECTED DURING PERIODS OF SURFACE RUNOFF TO ASCERTAIN PRECURSOR CONTRIBUTIONS FROM NON-POINT SOURCES OF POLLUTION.

II-342

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A STUDY OF THE MECHANISM AND RATES OF VOLATILIZATION OF CONTAMINANTS
FROM WATER BODIES
   START/ COMPL DATE :    09/77 - 12/80 : FUNDING : EST, - FY   77  / $   60000
    TASK/EPA CODE :K609A-206     / R805150-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : S W  KARICKHOFF
   INVESTIGATORS :    D   MACKAY                       UNIV, OF TORONTO
   MILE: 09/77 -START
         09/78 -ANNUAL REPORT
         09/79 -ANNUAL REPORT
         12/80 -ANNUAL REPORT
     OBJECTIVES: THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP A DEEPER QUANTI
     TATIVE UNDERSTANDING OF THE PROCESSES BY WHICH SOME ENVIRONMENTAL CONTAMIN
     ANTS VOLATILIZE FROM WATER BODIES TO THE ATMOSPHERE, SUCH A PREDICTIVE CAP
     ABILITY WILL BE USEFUL IN CONTRIBUTING ONE COMPONENT TO THE OVERALL PROCES
     S OF MODELLING ENVIRONMENTAL SYSTEMS, APPROACH: WORK WILL BE UNDERTAKEN IN
      A WIND-WATER TANK TO MEASURE VOLATILIZATION RATES AND IN PARTICULAR
     MEASURE LIQUID PHASE TRANSFER COEFFICIENTS AND CORRELATE THESE COEFFICIE
     NTS WITH WIND SPEED AND OTHER FLUID FLOW CHARACTERISTICS, HENRY'S LAW CONS
     TANTS WILL BE MEASURED FOR SELECTED CONTAMINANTS, NOTABLY HYDROCARBONS AND
     CHLORINATED HYDROCARBONS IN AQUEOUS SYSTEMS, PURE, WITH ELECTROLYTES AND
     WITH ADSORBING SPECIES SUSH AS MINERAL CLAYS, WHICH ARE ENCOUNTERED N
     ATURALLY, THIS WORK WILL BE INITIATED IN 1977, THUS, NO PROGRESS REPORT IS
      APPROPRIATE AT THIS TIME,
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II-343

DETECTION OF VIRAL GASTROENTERITIS AGENTS

START/ COMPL DATE :   05/77 - 05/79 : FUNDING : EST. - FY   77 / $ 48525
TASK/EPA CODE :D6148-035   / R805169-01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER : E W AKIN
INVESTIGATORS :   N R BLACKLOW   UNIV. OF MASSACHUSETTS
                  G   CUKOR   UNIV. OF MASSACHUSETTS
MILE: 05/79 -FINAL REPORT

ACUTE INFECTIOUS NONBACTERIAL GASTROENTERITIS IS CHARACTERISTICALLY AN EPIDEMIC DISEASE BUT IT ALSO PERSISTS IN AN ENDEMIC FORM THAT IS RESPONSIBLE FOR SPORADIC CASES OR LOCALIZED OUTBREAKS, POSING A MAJOR RECURRING PROBLEM IN PUBLIC HEALTH. THE MAJOR OBJECTIVE OF THIS PROJECT IS TO ASSESS THE CONTRIBUTION OF PARVOVIRUS-LIKE AGENTS TO ENVIRONMENTALLY TRANSMITTED ENTERITIS. WE PLAN A TWO-FOLD APPROACH TO THE PROBLEM. ONE IS TO DESIGN, DEVELOP AND TEST A SENSITIVE ASSAY METHOD FOR THE DETECTION OF THESE AGENTS IN STOOL AND WATER SPECIMENS WITHOUT THE NECESSITY OF PROPAGATING THE VIRUSES. THE SECOND APPROACH IS TO CULTIVATE THE VIRUSES IN QUESTION IN VITRO UTILIZING METHODOLOGIES THAT HAVE PROVEN SUCCESSFUL FOR OPTIMAL GROWTH OF OTHER KNOWN PARVOVIRUSES. SUCCESSFUL COMPLETION OF THIS PROJECT WILL RESULT IN 1) A RELIABLE METHOD FOR THE RAPID DIAGNOSIS OF THIS TYPE OF VIRAL ENTERITIS AND 2) A RAPID WAY OF TESTING ENVIRONMENTAL SAMPLES (E.G. LARGE QUANTITIES OF WATER) FOR THE PRESENCE OF ENTERITIS AGENTS.

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DEVELOPMENT OF DYNAMIC TWO-LAYER MODEL FOR STRATIFIED ESTUARIES

   START/ COMPL DATE :    04/77 - 12/78 : FUNDING : EST. - FY   77  / $   98000
    TASK/EPA CODE :K609A-406     / R805170-01  (GRANT)  PRIOR  FY    /         1
   PROJECT OFFICER : J W  FALCO
   INVESTIGATORS :    S G CHAMBERLAIN                RAYTHEON COMPANY
                      P V TAWARI                     RAYTHEON COMPANY
                      W   COMERY                     RAYTHEON COMPANY
   MILE: 04/77 -START PROJECT
        01/78 -INTERIM REPORT WHICH SUMMARIZES HYDRODYNAMICS ESTUARY MODEL
        12/78 -FINAL REPORT WHICH SUMMARIZES ESTUARY MODEL INCLUDING WATER QUA
    THE PRIMARY OBJECTIVE OF THE PROJECT IS TO DEVELOP A TWO-LAYER DYNAMIC
    MODEL OF ESTUARINE HYDRODYNAMICS AND WATER QUALITY. THE MODEL IS
    TO BE COMPATIBLE FOR LINKAGE WITH APPROPRIATE RIVER AND LOADING MODELS TO
     PROVIDE A BASIN PLANNING METHODOLOGY IN COASTAL AREAS. A SECOND OBJECTIVE
     IS TO TEST THE ESTUARY MODEL ON A FIELD DATA SET TO DEFINE ITS P
    ERFORMANCE CHARACTERISTICS. THE APPROACH IS TO COMPLETE THE DEVELOPMENT OF
    RAMSES HYDRODYNAMIC AND WATER QUALITY MODEL. THE HYDRODYNAMIC CODE
     WILL BE TESTED AS A FIRST PHASE IN THIS STUDY. TESTING WILL INCLUDE
    SENSITIVITY ANALYSIS OF RAMSES MODEL PARAMETERS. THE SECOND PHASE OF THIS
    STUDY WILL BE DIRECTED TOWARD QUALITY MODEL DEVELOPMENT. AN INTERIM REPORT
    WILL BE SUBMITTED IN JANUARY 1978 WHICH WILL SUMMARIZE THE PROGRESS OF
    THE PROJECT. THIS REPORT WILL INCLUDE DISCUSSIONS OF HYDRODYNAMIC MODEL DE
    VELOPMENT. A FINAL REPORT WILL BE SUBMITTED AT THE END OF THE PROJECT THAT
     WILL PRESENT THE DEVELOPMENT OF THE WATER QUALITY MODEL.
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II-345

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ATMOSPHERIC INPUT OF TRACE METALS TO LAKE MICHIGAN

  START/ COMPL DATE :    04/77 - 04/78 : FUNDING : EST. - FY   77  / $   21409
   TASK/EPA CODE :N606A-010    / R805172-01  (GRANT)  PRIOR  FY   /          1
  PROJECT OFFICER : M D  MULLIN
  INVESTIGATORS :   S J EISENREICH                   UNIV. OF MINNESOTA
  MILE: 07/78 -FINAL REPORT DUE
    THE OBJECTIVE OF THE RESEARCH PROJECT IS TO DETERMINE LOADINGS AND D
    EPOSITION RATES OF SELECTED TRACE METALS TO LAKE MICHIGAN FROM ATMOSPHERIC
    SOURCES. THE TRACE METAL CONTENT OF MONTHLY-INTEGRATING,
    BULK PRECIPITATION SAMPLES COLLECTED AT 22 LAND-BASED STATIONS, 2 IN-LAKE
    BUOY COLLECTORS AND 2 WET/DRY UNITS WILL BE MEASURED. THE BULK PRECIPI
    TATION SAMPLES WERE COLLECTED AT SITES IN WISCONSIN, ILLINOIS, INDIANA AND
    MICHIGAN BORDERING LAKE MICHIGAN FROM JULY, 1975 TO DECEMBER, 1976. T
    RACE METALS (ZN, CD, PB, CU, NI, FE, CO AND MN) WILL BE ANALYZED BY ATOMIC
     ABSORPTION SPECTROPHOTOMETRY (AAS) WITH A PERKIN-ELMER MODEL 360
    AAS EQUIPPED WITH AN HGA-2100 GRAPHITE FURNACE AND A DEUTERIUM
    BACKGROUND CORRECTOR. TRACE METAL DATA WILL BE REPORTED IN CONCENTRATION
     UNITS (MICROGRAM/L), DEPOSITION RATES (MICROGRAM/CM2/MONTH) AND IN TOTAL
    LOADINGS TO THE LAKE ON AN ANNUAL BASIS. STATISTICAL TECHNIQUES WILL BE
    USED TO IDENTIFY SOURCES WHERE POSSIBLE.
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EPIDEMIOLOGICAL STUDY OF DISEASE ASSOCIATED WITH WASTEWATER SPRINKLER
IRRIGATION
   START/ COMPL DATE :     00/00 - 00/00 : FUNDING : EST. - FY   77  / $   73580
    TASK/EPA CODE :D607A-007     / R805174-01  (GRANT)  PRIOR  FY   /          1
   INVESTIGATORS :    H I SHUVAL                    HEBREW UNIVERSITY OF JERUSALE
                      E   KATZENELSON               HEBREW UNIVERSITY OF JERUSALE
                      A M DAVIES                    HEBREW UNIVERSITY OF JERUSALE
   MILE: 08/77 -BEGIN EPIDEMIOLOGICAL STUDY
         09/78 -INTERIM REPORT
         08/79 -FINAL REPORT
     OBJECTIVES: A) TO DETERMINE THE DEGREE OF ADDED RISK OF COMMUNICABLE
     DISEASE INCIDENCE AMONG RESIDENTS OF AGRICULTURAL COMMUNITIES (KIBBU
     TZIM) PRACTICING WASTEWATER UTILIZATION AS COMPARED TO THOSE NOT UTILIZING
     WASTEWATER. B) TO DETERMINE WHETHER THE ADDED RISK IS ASSOCIATED WITH SPR
     INKLER IRRIGATION WITH WASTEWATER AND INFLUENCED BY PROXIMITY OF IRRIGATED
     AREAS TO RESIDENTIAL ZONES AND DOMINANT WIND DIRECTIONS. C) TO DETERMINE
     WHETHER THE DEGREE OF ADDED RISK IS ASSOCIATED WITH THE DEGREE OF WA
     STEWATER PURIFICATION AND CAN BE REDUCED AS A RESULT OF IMPROVED TREATMENT
     INCLUDING DISINFECTION OF EFFLUENT. APPROACH: RETROSPECTIVE DISEASE DATA
     FROM SOME 80 KIBBUTZIM (COLLECTIVE AGRICULTURAL SETTLEMENTS) PRACTICING
     SPRINKLER IRRIGATION WITH PARTIALLY TREATED NON-DISINFECTED OXIDATION PO
     ND EFFLUENT WILL BE COLLECTED AND COMPARED WITH DISEASE DATA FROM 130 CONT
     ROL KIBBUTZIM NOT PRACTICING ANY FORM OF SEWAGE UTILIZATION. ENVIRONMENTAL
     FACTORS SUCH AS DISTANCE FROM SEWAGE IRRIGATED FIELD, WIND DIRECTION AND
      DEGREE OF WASTEWATER TREATMENT WILL BE STUDIED.
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II-341

The purpose of this investigation is to determine the ability of young goats to dispose of combinations of non-toxic doses of selected toxic elements. The elemental compounds to be studied will be enclosed in gelatinous capsules and administered daily via gastric intubation with the aid of a balling gun. Control goats will be given the capsule containing only the "filler" or diluent, if any are used in preparing the elemental preparations. At the end of the first four weeks of flushing the treated and control goats will be sheared and the hair collected for analysis. Approximately 200 days after the initial treatment with the toxic elements all animals will be sacrificed, tissues(whole blood, kidneys, brain, liver, hoofs, teeth, hair, skeletal muscle and bones) will be collected. All tissues will be processed for storage and samples analyzed for the appropriate elements. The remainder of the tissues will be shipped to EMSL-LV to be used as reference materials in subsequent studies.

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TRANSPORT WATER CONTAMINATION IN COAL-SLURRY PIPELINES

   START/ COMPL DATE :     03/77 - 04/78 : FUNDING : EST. - FY   77  / $   80000
    TASK/EPA CODE :B6238-525     / R805176-01  (GRANT)  PRIOR  FY76 /          1
   PROJECT OFFICER : J L  KENNEDY
   INVESTIGATORS :    H S PEAVY                        MONTANA STATE UNIVERSITY
                      W A HUNT                         MONTANA STATE UNIVERSITY
                      P W JENNINGS                     MONTANA STATE UNIVERSITY
   MILE: 03/77 -FUNDING PACKAGE SUBMITTED
         04/77 -AWARD FUNDS FOR PROJECT
         08/77 -COMPLETE FIRST PUMP TESTS
         04/78 -FINAL REPORT RECEIVED
    THE OBJECTIVE OF THIS RESEARCH PROJECT WILL BE TO QUALIFY AND QUANTIFY ANY
     CONTAMINATION OF WATER USED AS A TRANSPORT MEDIA IN COAL-SLURRY
    PIPELINES. A SLURRY OF WATER AND COAL WILL BE PUMPED CONTINUOUSLY FOR SEV
    ERAL DAYS AROUND A 2,400 FOOT, CLOSED LOOP PIPELINE. SAMPLES WILL BE DRAWN
    OFF PERIODICALLY AND ANALYSIS WILL BE PERFORMED ON THE WATER PHASE FOR
    VARIOUS DISSOLVED AND SUSPENDED MATERIAL. TEST PARAMETERS WILL BE DETERMI
    NED BY PRIOR ANALYSIS OF THE COAL AND WATER USED TO MAKE UP THE SLURRY. IT
     IS ANTICIPATED THAT THESE PARAMETERS WILL INCLUDE SEVERAL METALS AS WELL
    AS SEVERAL ORGANIC CARBON COMPOUNDS. BOTH FRESH WATER AND SALINE
    WATER WILL BE USED AS A TRANSPORT MEDIA. SOME ORGANIC ANALYSIS OF WATER
    WHICH HAS CONTRACTED COAL HAS ALREADY BEEN DONE AT M.S.U. THIS WORK
    INDICATES THAT DISSOLVED ORGANIC CARBON OF UP TO 100 PPM CAN RESULT UNDER
    SOME CONDITIONS.
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WOOD PRESERVING WASTE RECYCLE AND INCINERATION SYSTEM

   START/ COMPL DATE :    04/76 - 01/79 : FUNDING : EST, - FY   77  / $   50000
    TASK/EPA CODE :B610B-607    / S805179-01  (GRANT)  PRIOR  FY76 /          1
   PROJECT OFFICER : V     DALLONS
   INVESTIGATORS :   P V HOLDEN
                     J A MACKIE                      PACIFIC WOOD TREATING CORP.
                     W   STOTT                       C H 2 M HILL INCORPORATED
   MILE: 10/77 -QUARTERLY REPORT                     MOGUL CORPORATION
         01/78 -QUARTERLY REPORT
         04/78 -QUARTERLY REPORT
         07/78 -QUARTERLY REPORT
         10/78 -DRAFT FINAL REPORT
         01/79 -FINAL REPORT RECEIVED
    THE OBJECTIVE IS TO EVALUATE A FULL SIZED RECYCLE SYSTEM FOR LIQUID WASTES
     FROM A WOOD PRESERVING PLANT WHERE THE WASTES ARE CONCENTRATED BY ULTR
    AFILTRATION AND REVERSE OSMOSIS WITH THE CONCENTRATE INCINERATED AND THE P
    ERMEATE CONSUMED AS BOILER FEED WATER. THE APPROACH CONSISTS OF COLLECTING
     DATA ON THE FEED, REJECT, AND PRODUCT AND MAINTAINING A LOG OF SYSTEM
     PERFORMANCE, QUANTITIES PROCESSED, OPERATING AND MAINTENANCE EX
    PENSE, AND OPERATING PROBLEMS. THE DATA WILL BE TABULATED AND PUBLISHED IN
    THE AMERICAN WOOD PRESERVERS ASSN. (AWPA) PROCEEDINGS. ALSO THE RESULTS
    WILL BE PUBLISHED IN EPA TECHNICAL REPORT SERIES. THE PHYSICAL FACILITY
    IS UNDER CONSTRUCTION AS OF THIS DATE. START-UP IS SCHEDULED FOR APRIL,
    1977.
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JOINT CENTRAL WASTE TREATMENT FACILITY FOR TAUNTON SILVER PLATES

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START/ COMPL DATE :    03/77 - 10/77 : FUNDING : EST. - FY   77  / $   30000
 TASK/EPA CODE :86108-461    / S805181-01  (GRANT)  PRIOR  FY76 /         1
PROJECT OFFICER : M K  STINSON
INVESTIGATORS :    H C GILL                     REED & BARTON SILVERSMITH
MILE: 03/77 -FUNDING PACKAGE SUBMITTED
      04/77 -AWARD FUNDS FOR PROJECT
      08/77 -DRAFT FINAL REPORT
      10/77 -FINAL REPORT RECEIVED
  OBJECTIVE: TO DEMONSTRATE THE FEASIBILITY OF BUILDING AND OPERATING A J
  OINT WASTE TREATMENT PLANT BY THREE ELECTROPLATING COMPANIES IN TAUNTON, M
  ASSACHUSETTS. APPROACH: TO MAKE AN ASSESSMENT OF THE PRESENT STATE OF EACH
   PARTICIPATING COMPANY. THEN CONDUCT AN EVALUATION AND SELECTION OF TREAT
  MENT AND RECOVERY ALTERNATIVES FOR THE WASTE STREAMS PRODUCED. A PLAN WILL
   THEN BE CHOSEN ACCORDING TO THE MOST ECONOMICAL APPROACH. CURRENT P
  LANS: IF JOINT TREATMENT IS PROVEN FEASIBLE, THEN DESIGN WOULD BE THE NEXT
   STAGE.
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FULL-SCALE DEMONSTRATION OF HYPERFILTRATION FOR CLOSED-CYCLE OPERATION
IN TEXTILE
   START/ COMPL DATE :    06/77 - 04/81 : FUNDING : EST. - FY   77  / $  324000
    TASK/EPA CODE :B610F-374    / S805182-01  (GRANT)  PRIOR  FY76 /          1
   PROJECT OFFICER : R     MOURNIGHAN
   INVESTIGATORS :    C A BRANDON                  RIEGEL TEXTILE CORPORATION
                      J E BOSTIC                   RIEGEL TEXTILE CORPORATION
                      R K TEED                     RIEGEL TEXTILE CORPORATION
                      J J PORTER                   RIEGEL TEXTILE CORPORATION
   MILE: 05/77 -FUNDING PACKAGE SUBMITTED
         09/77 -AWARD FUNDS FOR PROJECT
         09/79 -COMPLETE CONSTRUCTION AND BEGIN OPERATION
         09/80 -OPERATION COMPLETE
         12/80 -DRAFT REPORT
         04/81 -FINAL REPORT RECEIVED
     SUMMARY OF PROPOSED WORK - THE OBJECTIVES OF THIS PROJECT ARE TO
     DEMONSTRATE THE ECONOMIC AND TECHNICAL ADVANTAGES TO A FULL SCALE REVERSE
     OSMOSIS (HYPERFILTRATION) SYSTEM FOR CLOSED CYCLE OPERATION OF A TE
     XTILE DYING AND FINISHING PLANT. INVOLVED IS THE DESIGN, INSTALLATION, AND
      TWELVE-MONTH OPERATION OF A REVERSE OSMOSIS TREATMENT SYSTEM FOR THE
     HOT WASTEWATER FROM EITHER A CONTINUOUS DYE RANGE OR A GROUP OF TEN
     ATMOSPHERIC DYE BECKS. THE TWO TYPES OF EQUIPMENT ARE TYPICAL OF THE
     TWO BROAD CATEGORIES OF TEXTILE PROCESSING: CONTINUOUS AND BATCH. A
     CONCEPTUAL DESIGN WILL BE DEVELOPED FOR EACH PROCESS AND THE ONE APPEARING
     TO BE THE MOST ECONOMICALLY VIABLE WILL BE DEMONSTRATED. OUTPUTS FROM THIS
      PROGRAM CONSIST OF: A DETAILED DESIGN FOR TEXTILE WASTEWATER
     TREATMENT BY REVERSE OSMOSIS, DETAILED OPERATIONS AND CAPITAL COSTS, DO
     CUMENTATION OF ENERGY SAVINGS OF THE REVERSE OSMOSIS SYSTEM COMPARED TO CO
     NVENTIONAL WASTE TREATMENT METHODS AND EVALUATION OF CHEMICAL (DYES, SALT)
      RECYCLE IN THE DYING PROCESS.
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FULL-SCALE DEMONSTRATION OF HYPERFILTRATION FOR CLOSED-CYCLE OPERATION
IN TEXTILE
   START/ COMPL DATE :    06/77 - 04/81 : FUNDING : EST. - FY   77  / $  190000
    TASK/EPA CODE :B624B-374    / S805182-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : R    MOURNIGHAN
   INVESTIGATORS :    C A BRANDON                    RIEGEL TEXTILE CORPORATION
                      J E BOSTIC                     RIEGEL TEXTILE CORPORATION
                      R K TEED                       RIEGEL TEXTILE CORPORATION
                      J J PORTER                     RIEGEL TEXTILE CORPORATION
   MILE: 05/77 -FUNDING PACKAGE SUBMITTED
         09/77 -AWARD FUNDS FOR PROJECT
         09/79 -COMPLETE CONSTRUCTION AND BEGIN OPERATION
         09/80 -OPERATION COMPLETE
         12/80 -DRAFT REPORT
         04/81 -FINAL REPORT RECEIVED
     THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO
     OTHERS. THE OBJECTIVES OF THIS PROJECT ARE TO DEMONSTRATE THE ECONOMIC AND
     TECHNICAL ADVANTAGES TO A FULL SCALE REVERSE OSMOSIS (HYPERFILTRATION)
     SYSTEM FOR CLOSED CYCLE OPERATION OF A TEXTILE DYING AND FINISHING PLANT.
      INVOLVED IS THE DESIGN, INSTALLATION, AND TWELVE-MONTH OPERATION OF A
      REVERSE OSMOSIS TREATMENT SYSTEM FOR THE HOT WASTEWATER FROM EITHER A
      CONTINUOUS DYE RANGE OR A GROUP OF TEN ATMOSPHERIC DYE BECKS. THE TWO
     TYPES OF EQUIPMENT ARE TYPICAL OF THE TWO BROAD CATEGORIES OF TEXTILE P
     ROCESSING: CONTINUOUS AND BATCH. A CONCEPTUAL DESIGN WILL BE DEVELOPED FOR
     EACH PROCESS AND THE ONE APPEARING TO BE THE MOST ECONOMICALLY VIABLE WILL
      BE DEMONSTRATED. OUTPUTS FROM THIS PROGRAM CONSIST OF: A DETAILED
     DESIGN FOR TEXTILE WASTEWATER TREATMENT BY REVERSE OSMOSIS, DETAILED OP
     ERATIONS AND CAPITAL COSTS, DOCUMENTATION OF ENERGY SAVINGS OF THE REVERSE
      OSMOSIS SYSTEM COMPARED TO CONVENTIONAL WASTE TREATMENT MET
     HODS AND EVALUATION OF CHEMICAL (DYES, SALT) RECYCLE IN THE DYING PROCESS.
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CLOSED CYCLE DYEING - FULL SCALE DEMONSTRATION

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START/ COMPL DATE :    10/77 - 10/79 : FUNDING : EST. - FY   77  / $   25000
 TASK/EPA CODE :F610B-05     / S805182-01  (GRANT)  PRIOR  FY   /          1
PROJECT OFFICER : M     SAMFIELD
INVESTIGATORS :    C A BRANDON                       LA FRANCE INDUSTRIES
                   C A BRANDON                       CLEMSON UNIVERSITY
                   J J PORTER                        CLEMSON UNIVERSITY
                   D   TODD                          CLEMSON UNIVERSITY
                   J S JOHNSON                       U.S. ENERGY RES. & DEV. ADMIN
MILE: 10/77 -PROJECT ORGANIZATION DETAILS
      07/78 -TEXTILE PROCESS SELECTION
      10/78 -DESIGN AND COST QUANTIZED
      07/79 -EQUIPMENT PROCUREMENT AND INSTALLATION AND MEMBRANE FOR
      10/79 -MEMBRANE PERFORMANCE OPTIMIZATION
      01/80 -INITIAL EQUIPMENT OPERATION
      10/80 -FULL SCALE CLOSED CYCLE DEMONSTRATION
      07/81 -PREPARATION OF FINAL REPORT
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THE OBJECTIVE IS TO DEMONSTRATE THE USE OF CLOSED-CYCLE OPERATION IN A CONTINUOUS DYE RANGE AND TO ACCURATELY DETERMINE THE COST EFFECTIVENESS OF HYPERFILTRATION FOR THIS APPLICATION. IT IS EXPECTED THAT ENERGY, WATER AND MATERIALS WILL THUS BE RECOVERED. THE PROJECT INVOLVES THE DESIGN, INSTALLATION, AND TWELVE-MONTH OPERATION OF A FULL-SCALE HYPERFILTRATION (REVERSE OSMOSIS) SYSTEM FOR CLOSED-CYCLE OPERATION OF A TEXTILE DYEING OPERATION AT LAFRANCE INDUSTRIES. THE CLOSED OPERATION OF A CONTINUOUS DYE RANGE AND THE GROUPS OF TEN ATMOSPHERIC DYE BECKS WILL BE INVESTIGATED. BOTH TYPES OF EQUIPMENT ARE CURRENTLY BEING USED AT LAFRANCE FOR DYEING HEAVY COTTON VELOUR FABRICS. THE TWO TYPES OF EQUIPMENT ARE REPRESENTATIVE OF THE TWO BROAD CATEGORIES OF TEXTILE PROCESSING - CONTINUOUS AND BATCH. THE FULL-SCALE MEMBRANE SYSTEM WILL BE DESIGNED FOR ONE OF THESE TEXTILE PROCESSES THAT IS SELECTED BASED ON THE EVALUATION OF CONCEPTUAL SYSTEM DESIGNS DEVELOPED FOR EACH. THE OUTPUT IS TECHNOLOGY TRANSFER TO THE TEXTILE INDUSTRY AT LARGE BOTH IN THE FORM OF AN EPA REPORT AND A FULL-SCALE DEMO UNIT.

II-35-4

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INTERACTIONS OF METAL IONS WITH ORGANIC LIGANDS IN NATURAL WATERS

  START/ COMPL DATE :     04/77 - 04/80 : FUNDING : EST. - FY   77  / $   65000
   TASK/EPA CODE :K617B-214     / R805183-01  (GRANT)  PRIOR  FY    /         1
  PROJECT OFFICER : D S  BROWN
  INVESTIGATORS :     D F NATUSCH
                      R K SKOGERBOE                  COLORADO STATE UNIVERSITY
                      J G OSTERYOUNG                 COLORADO STATE UNIVERSITY
  MILE: 04/78 -FIRST ANNUAL REPORT                   COLORADO STATE UNIVERSITY
        04/79 -SECOND ANNUAL REPORT
        04/80 -FINAL REPORT
   PROJECT OBJECTIVES INCLUDE DETERMINATION OF THE IMPORTANCE OF ORGANIC
   LIGANDS IN DETERMINING THE SOLUTION SPECIES OF METAL IONS IN NATURAL
   WATERS; IDENTIFICATION OF THE LIGANDS OF PRIMARY IMPORTANCE; DET
   ERMINATION OF EITHER THERMODYNAMIC METAL COMPLEX STABILITY CONSTANTS OR OF
    CONDITIONAL BINDING CONSTANTS; AND DEVELOPMENT OF A MODEL CAPABLE OF
   PREDICTING THE CHEMICAL FORMS IN WHICH A METAL EXISTS IN A NATURAL WATER.
    EMPHASIS IS PLACED ON DEVELOPING A PROTOCOL FOR ESTABLISHING META
   L-BINDING CAPACITIES AND BINDING CONSTANTS OF NATURAL WATERS. TO THIS END,
    BOTH EXISTING AND NEW METHODOLOGY IS PROPOSED FOR EXTENSIVE INVESTIGAT
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NEW APPROACHES TO QUANTITATING THE PULMONARY EFFECTS OF INHALED
POLLUTANTS
   START/ COMPL DATE :    07/77 - 06/80 : FUNDING : EST. - FY   77  / $  174800
    TASK/EPA CODE :H601C-7269    / R805184      (GRANT)  PRIOR  FY    /          1
   PROJECT OFFICER : M T  WAGNER
   INVESTIGATORS :   P A BROMBERG                        UNIV. OF NORTH CAROLINA
                     R L PIMMEL                          UNIV. OF NORTH CAROLINA
                     M   FRIEDMAN                        UNIV. OF NORTH CAROLINA
                     Y   JEONG                           UNIV. OF NORTH CAROLINA
                     S   KAUFMAN                         UNIV. OF NORTH CAROLINA
                     D   WINTER                          UNIV. OF NORTH CAROLINA
   MILE: 07/77 -ACQUIRE EQUIPMENT AND SUPPLIES, CALIBRATE AND INITIATES BASELIN
         07/78 -INITIATE MECHANICS, MICROVASCULAR INJURY, MUCOCILIARY CLEARANCE
         07/79 -COMPLETE ABOVE AND INITIATE VENTILATORY CONTROL AND ASTHMA STUD
         07/80 -COMPLETE ABOVE AND PREPARE FINAL REPORT
    OBJECTIVES: TO QUANTITATE THE EFFECTS OF INHALATION OF 0-1 PPM OZONE AND
    SO2-O3 MIXTURES ON AIRWAY MECHANICS, AIRWAY NEURAL RECEPTORS AND
    VENTILATORY CONTROL, MUCOCILIARY TRANSPORT AND RELATED BIOCHEMICAL PHEN
    OMENA, AND ON THE PULMONARY MICROCIRCULATION IN ANIMALS. WE PROPOSE TO USE
     RELATIVELY NEW AND NON-INVASIVE TECHNIQUES WHICH ARE APPLICABLE TO
    HUMAN STUDIES. THESE TECHNIQUES INCLUDE: 1) FLUOROSCOPIC RECORDING OF MOV
    EMENT OF RADIO-OPAQUE TEFLON DISCS FOLLOWING INSUFFLATION INTO THE LARGE A
    IRWAYS; (2) FORCED OSCILLATORY MECHANICS; 3) MULTIPLE GAS REBREATHING WITH
     MASS-SPECTROMETRIC ANALYSIS FOR MEASUREMENTS OF MICROCIRCULATION;
     4) OCCLUSION PRESSURE, TI, TE AND VT FOR VENTILATORY CONTROL. OTHER
    MEASUREMENTS WILL REQUIRE INVASIVE TECHNIQUES: SINGLE FIBER RECORDING OF
    PULMONARY AFFERENT IMPULSES IN THE VAGUS; MEASUREMENT AND LOCALIZATION OF
    CYCLIC NUCLEOTIDES.
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II-356

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THE IMPORTANCE AND FUNCTIONS OF ALLUVIAL VALLEY FLOORS

   START/ COMPL DATE :    06/77 - 02/80 : FUNDING : EST. - FY   77  / $  110000
    TASK/EPA CODE :B623B-517     / R805185-01  (GRANT)  PRIOR  FY76 /         1
   PROJECT OFFICER : J F  MARTIN
   INVESTIGATORS :    P A RECHARD                          UNIV. OF WYOMING
   MILE: 06/77 -FUNDING PACKAGE SUBMITTED
         07/77 -AWARD FUNDS FOR PROJECT
         03/78 -AWARD CONTINUATION
         02/80 -FINAL REPORT RECEIVED
     THERE ARE BASICALLY FIVE OBJECTIVES FOR THE STUDY: (1) TO DEFINE THE
     MECHANISMS INVOLVED IN THE HYDROLOGY OF THE ALLUVIAL SYSTEM, (2) TO I
     NVESTIGATE THE STRATIGRAPHIC RELATIONSHIP OF THE STREAM DEPOSITS, (3) TO I
     DENTIFY THE SOIL TYPES REPRESENTED, (4) TO DETERMINE REPRODUCTIVITY OF THE
     NATIVE PLANT COMMUNITY, AND (5) TO PROVIDE INFORMATION RELEVANT FOR STATE
     AND FEDERAL REGULATORY AGENCIES. IT IS INTENDED THAT THIS STUDY DELINEATE
     THE PROBLEMS, MINEABILITY, TREATABILITY, ETC. OF POTENTIAL ALLUVIAL VALLEY
     MINE SITES. THIS EFFORT IS TO DEFINE THE CRITICALLY IMPORTANT PHYSICAL
     FEATURES OF ALLUVIAL VALLEYS WHICH HAVE MAJOR IMPACTS TO THE HYDROLOGIC
     CYCLE. AFTER AN EXTENSIVE LITERATURE REVIEW, THREE SITES IN MONTANA AND
     WYOMING WILL BE SELECTED FOR FIELD STUDY.
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DEMONSTRATION PROGRAM TO SHOW LANDOWNERS AND MUNICIPALITIES ACCEPTABLE
SYSTEMS FOR APPLYING SLUDGE ON LAND
   START/ COMPL DATE :    08/77 - 08/80 : FUNDING : EST. - FY   77  / $  195681
    TASK/EPA CODE :C611B-7061   / S805189-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : G K  DOTSON
   INVESTIGATORS :   V V HAMPARIAN                    FARM BUREAU DEVELOPMENT CORP.
                     V V HAMPARIAN                    OHIO STATE UNIVERSITY
                     J K HILL                         FARM BUREAU DEVELOPMENT CORP.
                     N   MUSSELMAN                    FARM BUREAU DEVELOPMENT CORP.
                     C R DORN                         OHIO STATE UNIVERSITY
   MILE: 09/77 -GRANT AWARD
         09/80 -PROJECT COMPLETED
         02/81 -FINAL REPORT PUBLISHED
     THE OBJECTIVE IS TO DEMONSTRATE SAFE BENEFICIAL USE OF WASTEWATER SLUDGE
     AS A SOIL AMENDMENT ON AGRICULTURAL LAND. INSTITUTIONAL ARRANGEMENTS T
     O PERMIT OBJECTIVE EVALUATIONS AND DECISIONS BY BOTH RURAL AND URBAN RESID
     ENTS WILL BE DEMONSTRATED. THE EFFECT OF PROPER APPLICATION AND MANAGEMENT
      OF A LAND APPLICATION OF SLUDGE ON PUBLIC HEALTH AND THE ENVIRONMENT
     WILL BE DETERMINED. FOUR COMMUNITIES IN OHIO THAT ALREADY DISPOSE OF
      SLUDGE BY SPREADING IT ON FARM LAND WILL SUPPLY SLUDGE FOR APPLICATION T
     O SELECTED FARMS IN A CAREFULLY PLANNED AND MANAGED SYSTEM. IN ADDITION TO
      SLUDGE APPLICATION ON FIELDS, SLUDGE WILL BE APPLIED TO CAREFULLY
     SELECTED PLOTS FOR MEASUREMENT OF ITS EFFECT ON YIELD AND COMPOSITION OF
     CROP, COMPOSITION SOIL, AND CONSUMPTION OF GROUND AND SURFACE WATER. AN
     EPIDEMIOLOGICAL STUDY OF LIVESTOCK AND PEOPLE WHO COME IN CONTACT WITH
     SLUDGES WILL MEASURE THE HEALTH EFFECTS OF SLUDGE SPREADING.
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CHRONIC BIOASSAYS WITH DAPHNIDS AS A TOOL FOR PREDICTING THE TOXICITY OF
 COMPLEX INDUSTRIAL EFFLUENT TO THE BIOTA OF A RECEIVING STRE
   START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST. - FY   77  / $   21063
    TASK/EPA CODE :N608A-089    / R805193-01  (GRANT)  PRIOR  FY    /         1
   PROJECT OFFICER : W B  HORNING
   INVESTIGATORS :   R W WINNER                     MIAMI UNIVERSITY
   MILE: 06/78 -CREATE A MODEL FOR USING DAPHNIA BIOASSAYS TO PREDICT THE IMPAC
         06/79 -TEST RELIABILITY OF MODEL AND COMPLETE A FINAL REPORT
     OBJECTIVES: TO DETERMINE WHETHER CHRONIC EFFLUENT BIOASSAYS WITH DAPHNIDS
     CAN BE USED TO DETERMINE HOW MUCH THAT EFFLUENT MUST BE DILUTED BEFORE
     IT WILL NOT HAVE AN UNACCEPTABLE EFFECT ON THE BIOTA OF THE RECEIVING S
     TREAM. APPROACH: FIVE-WEEK BIOASSAYS WILL BE CONDUCTED WITH DILUTIONS OF A
      COMPLEX INDUSTRIAL EFFLUENT USING DAPHNIA MAGNA AND D. PARVULA. THESE
      WILL BE COMPARED TO CHRONIC BIOASSAYS RUN IN UNDILUTED STREAM WATER
     COLLECTED FROM STATIONS DOWNSTREAM FROM THE POINT OF EFFLUENT DISCHARG
     E. BOTH KINDS OF BIOASSAYS WILL BE COMPARED TO MACROINVERTEBRATE, FISH AND
      PERIPHYTIC COMMUNITIES AT DOWNSTREAM STATIONS IN THE RECEIVING
     WATERS. TOXICANT CONCENTRATIONS AT THE SAMPLING STATIONS WILL BE COMPARED
     TO EFFLUENT DILUTIONS CAUSING NO ADVERSE EFFECT ON BIOASSAY TEST ORGAN
     ISMS TO DETERMINE WHETHER THE BIOASSAYS CAN PREDICT WHERE THE STREAM BIOTA
     WILL HAVE RECOVERED FROM THE EFFLUENT STRESS.
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II-359

805194

Permeabilities, diffusivities and solubilities of major hydrocarbon pollutants and of oxygen in a variety of polymeric materials will be measured as functions of temperature, pressure, and pollutant concentration. The results of these measurements will be used to design interfaces for source monitoring of hydrocarbons, but their utility should extend well beyond this particular application. Potential applications include the design of hydrocarbon permeation tubes for calibrating ambient hydrocarbon analyzers, and the evaluation of plastic bag materials for storing grab samples to be analyzed for hydrocarbon concentrations.

Membranes will be sought which are either selectively permeable or impermeable to oxygen, with the object of reducing or eliminating the oxygen effect in flame ionization detection.

A portable interface-analyzer system for continuous unattended monitoring of hydrocarbon emissions will be designed, assembled, and field tested in a variety of source enviornments.

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GENETIC VARIATION AND RESISTANCE TO CARCINOGENS IN NATURAL WATERS

   START/ COMPL DATE :    06/77 - 06/80 : FUNDING : EST. - FY   77  / $   40000
    TASK/EPA CODE :Q625F-1-02   / R805195-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : N L  RICHARDS
   INVESTIGATORS :   R J SCHULTZ                       UNIV. OF CONNECTICUT
   MILE: 01/78 -COMPLETE TOXICITY TESTS, BEGIN CARCINOGEN EXPOSURE
         06/79 -PRELIMINARY EVALUATION OF CARCINOGEN METHODOLOGY
         06/80 -EVALUATION OF METHOD FOR CARCINOGEN BIOASSAY
     THE OBJECTIVE OF THIS GRANT IS TO EVALUATE THE FEASIBILITY OF USING
     ISOGENIC FISH TO DETECT CARCINOGENS. THE VALIDATED BIOASSAY SYSTEM
     WOULD BE USED TO TEST THE CARCINOGENIC PROPERTIES OF COMPOUNDS FROM
     PETROLEUM AND SHALE OIL.
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II-361

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CHLORINATION OF PUBLIC WATER SUPPLIES AND CANCER

   START/ COMPL DATE :    10/76 - 10/77 : FUNDING : EST. - FY   77  / $   33602
    TASK/EPA CODE :D614B 046    / R805198-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : L J  MCCABE
   INVESTIGATORS :   C W KRUSE                    JOHNS HOPKINS UNIVERSITY
                     G W COMSTOCK                 JOHNS HOPKINS UNIVERSITY
                     J A TONASCIA                 JOHNS HOPKINS UNIVERSITY
   MILE: 04/78 -REPORT
     THE OBJECTIVE IS TO CONFIRM OR DISPROVE THE SUGGESTED ASSOCIATION BETWEEN
     VOLATILE ORGANIC COMPOUNDS PRODUCED BY THE CHLORINATION OF DRINKING WATER
     AND CANCER RISK. THIS HYPOTHESIS WILL BE TESTED IN A POPULATION-BASED ST
     UDY CARRIED OUT IN THE TRAINING CENTER FOR PUBLIC HEALTH RESEARCH IN WASHI
     NGTON COUNTY, MARYLAND. THE APPROACH IS TO PARTITION THE POPULATION INTO T
     HOSE DRINKING CHLORINATED WATER AND THOSE NOT DRINKING CHLORINATED WATER A
     ND COMPARING CANCER MORTALITY AND MORBIDITY EXPERIENCES. THE STUDY WILL FO
     CUS ON CHLOROFORM AND SEVERAL SITE-SPECIFIC NEOPLASMS, LIVER AND KIDNEY IN
      PARTICULAR. THE UNIQUE CENSUS DATA AVAILABLE PERMITS ADJUSTMENTS
     FOR CONFOUNDING VARIABLES SUCH AS SEX, AGE, MARITAL STATUS, EDUCATION,
     HOUSING, CIGARETTE SMOKING, YEARS OF RESIDENCE AND CHURCH ATTENDANCE (A
     LCOHOL) AS WELL AS DRINKING WATER. THE SECOND PHASE WILL BE A CASE-CONTROL
      STUDY BETWEEN CHLOROFORM LEVEL IN DRINKING WATER AND LIVER CANCER
     INCIDENCE.
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II-362

REMOVAL OF CONTAMINANTS FROM DRINKING WATER BY REVERSE OSMOSIS

START/ COMPL DATE : 08/77 - 08/79 : FUNDING : EST. - FY 77 / $ 232950
TASK/EPA CODE :C614 -7170 / R805207 (GRANT) PRIOR FY / 1
PROJECT OFFICER : T SORG
INVESTIGATORS : W D DARBY
V B PICKETT CHARLOTTE HARBOR WATER ASSN.
P L CULLER CHARLOTTE HARBOR WATER ASSN.
CHARLOTTE HARBOR WATER ASSN.

MILE: 01/78 -REVERSE OSMOSIS EQUIPMENT INSTALLED
07/78 -STUDIES ON INORGANIC CONTAMINANT REMOVAL WITH DEEP WELL WATER C
11/78 -REPORT COMPLETED ON DEEP WELL WATER STUDIES
01/79 -STUDIES ON INORGANIC AND ORGANIC CONTAMINANT REMOVAL WITH SHALL
08/79 -FINAL REPORT COMPLETED

THE OBJECTIVES OF THIS RESEARCH PROJECT ARE TWO: (1) EVALUATE THE EFFECTIVENESS OF LOW AND HIGH PRESSURE REVERSE OSMOSIS SYSTEMS TO REMOVE ARSENIC, BARIUM, CADMIUM, CHROMIUM, LEAD, MERCURY, SELENIUM, SILVER, FLUORIDE, AND NITRATE FROM GROUND WATER; (2) DETERMINE THE ENERGY AND OTHER OPERATING COSTS OF EACH SYSTEM; AND (3) EVALUATE THE EFFECTIVENESS OF THE TWO SYSTEMS TO REMOVE ORGANIC PRECURSOR MATERIAL THAT FORMS TRIHALOMETHANES WHEN CHLORINATED. TWO FULL SCALE REVERSE OSMOSIS UNITS EACH PRODUCING ABOUT 40,000 GALLONS OF WATER PER DAY WILL BE SET UP IN PARALLEL OPERATION. RAW WATER FROM DEEP WELLS (1400-1800 IDS) AND SHALLOW WELLS (600-1000 TDS AND HIGHLY COLORED) WILL BE SPIKED WITH THE SPECIFIC CANTAMINANTS AND THE RAW, REJECT, AND PRODUCT WATER SAMPLED TO DETERMINE REMOVAL EFFICIENCIES. OPERATING COST RECORDS WILL BE ALSO MAINTAINED ON BOTH UNITS.

II-363

IMPROVED SCORING OF CHEMICAL TRANSFORMATION OF C3H/10T1/2 CELLS

START/ COMPL DATE : 10/77 - 09/80 : FUNDING : EST. - FY 77 / $ 270000
TASK/EPA CODE :H625F-7153 / R805208 (GRANT) PRIOR FY / 1
PROJECT OFFICER : M D WATERS
INVESTIGATORS : C HEIDELBERGER UNIV. OF SOUTHERN CALIFORNIA
S MONDAL UNIV. OF SOUTHERN CALIFORNIA
R F BAKER UNIV. OF SOUTHERN CALIFORNIA
MILE: 08/77 -PROJECT TO BE FUNDED

WE PLAN TO IMPROVE THE QUANTITATIVE ONCOGENIC TRANSFORMATION BY CHEMICAL CARCINOGENS AND SCORE FOR TRANSFORMATION AT EARLIER TIMES SO THAT THE SYSTEM CAN BE USEFUL AS A RAPID PRE-SCREEN FOR ENVIRONMENTAL POLLUTION. INDIVIDUAL COMPOUNDS, AS WELL AS MIXTURES, WILL BE STUDIED. THE USE OF SINGLE CELLS IN INDIVIDUAL DISHES AS THE BASIC SYSTEM WILL BE IMPROVED, AND THE INHIBITORY INFLUENCE OF CELL DENSITY ON TRANSFORMATION FREQUENCY WILL BE ACCURATELY QUANTITATED. TRANSFORMED C3H/10T1/2 CELLS HAVE A DIFFERENT MORPHOLOGY IN THE SCANNING ELECTRON MICROSCOPE. THIS PROPERTY WILL BE USED TO DEVELOP AN ALTERNATIVE ASSAY FOR TRANSFORMATION AND TO DETERMINE AT WHAT TIME AFTER CARCINOGEN TREATMENT CELLS BECOME TRANSFORMED.

II-364

ENVIRONMENTAL CONTAMINANTS - EFFECTS ON TUMOR GROWTH AND IMMUNITY

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START/ COMPL DATE :    07/77 - 07/80 : FUNDING : EST. - FY   77  / $  105475
 TASK/EPA CODE :D607A-027     / R805210      (GRANT)  PRIOR  FY    /         1
PROJECT OFFICER : P    HEFFERNAN
INVESTIGATORS :    L D KOLLER                        OREGON STATE HIGHER EDUC, SYS
                   N I KERKVLIET                     OREGON STATE HIGHER EDUC, SYS
MILE: 09/77 -PROJECT BEGAN
      03/79 -EFFECTS OF CD ON TUMOR GROWTH & IMMUNITY COMPLETE
      08/80 -EFFECTS OF AS ON TUMOR GROWTH & IMMUNITY COMPLETE
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TO DETERMINE THE EFFECTS OF CADMIUM AND ARSENIC ON THE IMMUNE RESPONSE OF ANIMALS TO A GROWING TUMOR AND TO DETERMINE THE EFFECTS OF CONTAMINANT-INDUCED IMMUNE ALTERATION ON THE INCIDENCE AND GROWTH RATE OF TUMORS IN INTOXICATED ANIMALS. SEVERAL PARAMETERS OF IMMUNITY WILL BE ASSESSED, INCLUDING LYMPHOCYTE-MEDIATED CYTOTOXICITY, LYMPHOKINE PRODUCTION, AND SERUM BLOCKING ACTIVITY, IN ORDER TO DETERMINE THE SITE OF ACTION OF THE CONTAMINANT ON IMMUNE RESPONSES TO TUMOR GROWTH.

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MANUAL OF WATER WELL MAINTENANCE AND REHABILITATION TECHNOLOGY

   START/ COMPL DATE :    07/77 - 06/79 : FUNDING : EST. - FY   77  / $   91848
    TASK/EPA CODE :L609B-18      / R805211-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : M R  SCALF
   INVESTIGATORS :   J H LEHR                         NATL. WATER WELL ASSOCIATION
                     H   HEISS                        NATL. WATER WELL ASSOCIATION
   MILE: 07/79 -MANUAL OF WATER WELL MAINTENANCE AND REHABILITATION
     OBJECTIVES: TO DEVELOPMENT OF A MANUAL ON WATER WELL REHABILITATION AND M
     AINTENANCE TECHNOLOGY THAT WOULD DESCRIBE IN DETAIL THE FACTORS THAT WOULD
      AFFECT WELL PROBLEMS AND THE TECHNOLOGY AND METHODOLOGY OF WELL
     SERVICING. APPROACH: A) SURVEY OF LITERATURE RELATING TO WATER WELL AND
      PETROLEUM AND GAS WELL TECHNOLOGY. B) SURVEY NWWA MEMBERSHIP FOR WELL
      MAINTENANCE AND REHABILITATIVE METHODS COMMONLY USED AND
     HIGHLIGHT INNOVATIVE TECHNOLOGY. C) EVALUATE PROCEDURES USED BY COMPANIES
      WHO SPECIALIZE IN WELL MAINTENANCE AND REHABILITATION. D) EVALUATE M
     ETHODS USED BY PETROLEUM INDUSTRY TO DETERMINE APPLICABILITY TO WATER WELL
     INDUSTRY. E) FIELD TESTING OF NEW METHODOLOGIES AND EQUIPMENT TO INSURE
     VALIDITY OF PERFORMANCE CLAIMS.
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II-366

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A COMPARATIVE SELECTIVITY STUDY OF THE NITROGEN OXIDE ELECTRODE AND THE
SOLID STATE NITRATE ELECTRODE FOR DETERMINATION OF NITRATE
   START/ COMPL DATE :    09/77 - 03/79 : FUNDING : EST. - FY   77  / $   47880
    TASK/EPA CODE :A612A-02      / R805212-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : M    GALES
   INVESTIGATORS :   R F WILSON                     TEXAS SOUTHERN UNIVERSITY
   MILE: 07/78 -COMPLETE EVAL. OF NITROGEN OXIDE AND SOLID STATE NITRATE ELECTR
         12/78 -COMPLETE ENVIRONMENTAL SAMPLE ANALYSIS
         12/79 -FINAL REPORT
     THE PRIMARY OBJECTIVE OF THIS PROPOSED STUDY IS TO EVALUATE THE SEL
     ECTIVITY OF THE NITROGEN OXIDE AND THE NITRATE ION SELECTIVE ELECTRODES BY
     INVESTIGATING POTENTIAL INTERFERENCES OF OTHER IONS. THE DATA AND PERCENTA
     GE EFFICIENCY OBTAINED USING THE NITROGEN OXIDE SELECTIVE ELECTRODE, AFTER
      A CADMIUM REDUCTION OF NITRATE TO NITRITE, WILL BE COMPARED WITH THOSE
     OBTAINED USING THE NITRATE ION SELECTIVE ELECTRODE FOR WATER AND WASTE W
     ATER SAMPLES. UPON COMPLETION OF THE COMPARATIVE STUDY OF THE EXPERIMENTAL
     VARIABLES THAT AFFECT THE ELECTRODES, A METHOD FOR THE DETERMINATION OF
     NITRATE USING THE ELECTRODE THAT GIVES THE BEST ACCURACY WILL BE PROPOSED
      AND ITS VALIDITY TESTED ON WATER AND WASTE WATER SAMPLES. THE SUCCESSFUL
      COMPLETION OF THIS PROJECT SHOULD PROVIDE A RESERVOIR OF USEFUL DATA
     ON THE QUANTITATIVE DETERMINATION OF NITRATE NITROGEN VALUES.
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II-367

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A COMPARATIVE SELECTIVITY STUDY OF THE NITROGEN OXIDE ELECTRODE AND THE
SOLID STATE NITRATE ELECTRODE FOR DETERMINATION OF NITRATE
   START/ COMPL DATE :    10/77 - 10/79 : FUNDING : EST, - FY   77  / $   28000
    TASK/EPA CODE :A625C-20      / R805212-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : M E  GALES
   INVESTIGATORS :   R F WILSON                      TEXAS SOUTHERN UNIVERSITY
     THE OBJECTIVE OF THIS STUDY IS TO EVALUATE THE NITRATE ELECTRODES AND
     OPTIMIZE CONDITION FOR THE ANALYSIS OF NITRATE IN A VARIETY OF WATER AND
     WASTE WATER SAMPLES, THE COMPLETION OF THIS RESEARCH SHOULD PROVIDE EPA
     WITH A SELECTIVE, EFFICIENT AND ECONOMICAL METHOD FOR THE QUANTITATIVE
      DETERMINATION OF NITRATE,
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II-368

CROSS TRANSMISSION OF GIARDIA

START/ COMPL DATE : 02/77 - 01/78 : FUNDING : EST. - FY 77 / $ 29300
TASK/EPA CODE :D614B-037 / R805215-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : T H ERICKSEN
INVESTIGATORS : C P HIBLER COLORADO STATE UNIVERSITY
R B DAVIES COLORADO STATE UNIVERSITY
MILE: 05/78 -REPORT

IN SEVERAL INSTANCES THE SOURCE OF ACUTE GIARDIOSIS IN MAN HAS BEEN TRACED TO WATER SUPPLIES, BUT THE SOURCE OF THE WATER CONTAMINATIONS IS RARELY DISCOVERED. WILD OR DOMESTIC ANIMALS OFTEN HAVE BEEN SUSPECTED OF CONTAMINATING THE WATER. GIARDIA HAS BEEN FOUND IN SEVERAL FREE-RANGING MAMMALS BUT IT IS NOT KNOWN IF THESE WILL CAUSE INFECTION IN MAN. THEREFORE, ISOLATES OF HUMAN GIARDIA LAMBLIA WILL BE GIVEN TO AS MANY SPECIES OF WILD AND DOMESTIC ANIMALS AS POSSIBLE (AT LEAST 22 SPECIES AND POSSIBLY AS MANY AS 33). ADDITIONAL CROSS TRANSMISSION STUDIES WILL BE DONE BY INFECTING AS MANY OF THE 33 SPECIES AS POSSIBLE WITH GIARDIA RECOVERED FROM ANY FREE-RANGING OR DOMESTIC ANIMAL. AS HUMAN GIARDIA WILL INFECT DOGS, SPECIFIC PATHOGEN FREE (SPF) BEAGLE PUPPIES WILL BE USED TO SCREEN ALL POSITIVE SPECIES. IF THE PUPPIES BECOME POSITIVE FOR GIARDIA, IT WILL BE ASSUMED THAT ANIMAL GIARDIA WILL INFECT HUMANS. SUBSEQUENT PROOF (HUMAN INFECTIONS) MUST BE UNDERTAKEN BY A MEDICAL SCHOOL OR THE NATIONAL CENTER FOR DISEASE CONTROL OR THE ENVIRONMENTAL PROTECTIO

WET/DRY COOLING TOWER TEST MODULE PROGRAM

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    START/ COMPL DATE :    08/77 - 07/78 : FUNDING : EST. - FY   77  / $  100000
     TASK/EPA CODE :F624A-043    / R805220      (GRANT)  PRIOR  FY   /         1
    PROJECT OFFICER : T G  BRNA
    INVESTIGATORS :   W C MARTIN                      SOUTHERN CALIF. EDISON COMPAN
                      T P FITZPATRICK                 SOUTHERN CALIF. EDISON COMPAN
    MILE: 09/77 -COMPLETION OF CONSTRUCTION OF COOLING TOWER TEST MODULE
          10/77 -START OF COOLING TOWER TEST PROGRAM
          10/78 -COMPLETION OF COOLING TOWER TEST PROGRAM
          04/79 -PUBLICATION OF FINAL REPORT FOR WET/DRY COOLING TEST MODULE PRO
      OBJECTIVES: IN THIS MULTI-SPONSORED PROJECT, THE PROGRAM OBJECTIVES ARE:
      A. TO DETERMINE THE WATER CONSERVATION AND OPERATIONAL CHARACTERISTICS OF
       THE WET/DRY COOLING TOWER TEST MODULE IN AN ELECTRICAL POWER
      PLANT SITUATION, AND B. TO DEVELOP AND CONFIRM A MATHEMATICAL MODEL FOR A
      CCURATELY DESCRIBING AND PREDICTING THE PERFORMANCE OF THE WET/DRY COOLING
      SYSTEM. APPROACH: A FULL-SIZE WET/DRY COOLING TOWER CELL WILL BE INST
      ALLED AND TESTED AT A PLANT SITE OVER A ONE-YEAR PERIOD. TEST DATA WILL BE
       USED TO CONFIRM THE MATHEMATICAL MODEL. OUTPUTS: TEST MODULE, COOLING S
      YSTEM AND AMBIENT DATA WILL BE COLLECTED DURING THE TESTING PHASE WHICH IS
      SCHEDULED FOR COMPLETION IN OCTOBER 1978. THESE DATA WILL BE I
      NCLUDED IN THE COMPREHENSIVE REPORT FOR THE TEST PROGRAM, THE REPORT TO BE
      COMPLETED IN APRIL 1979.
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II-380

DEVELOP TAPERED ELEMENT OSCILLATING MICRO BALANCE (TEOM) FOR AMBIENT MASS MEASUREMENT

START/ COMPL DATE : 08/77 - 08/80 : FUNDING : EST. - FY 77 / $ 19040
TASK/EPA CODE :G712B-BE-47 / R805222-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : C LEWIS
INVESTIGATORS : H PATASHNICK DUDLEY OBSERVATORY
G RUPPRECHT DUDLEY OBSERVATORY
MILE: 06/77 -PHOTOTYPE COMPLETED

OBJECTIVES: TO DEVELOP AN INSTRUMENT FOR REAL-TIME MEASUREMENT OF AMBIENT AEROSOL MASS ASSOCIATED WITH RESPIRABLE AEROSOL PARTICLES. APPROACH: A NEWLY DEVELOPED DEVICE - TAPERED ELEMENT OSCILLATING MICROBALANCE (TEOM) - SIMILAR TO A CLASSICAL QUARTZ CRYSTAL MICROBALANCE, BUT WITHOUT MANY OF THE LATTER'S PROBLEMS, WILL BE MATED TO A DICHOTOMOUS VIRTUAL IMPACTOR. THE IMPACTOR SEGREGATES PARTICLES WHOSE AERODYNAMIC DIAMETER IS LESS THAN 3.5 MICRONS, AND WHOSE ACCUMULATED MASS IS SUBSEQUENTLY MEASURED WITH THE TEOM. CURRENT PLANS/PROGRESS: WORK IS EXPECTED TO BEGIN BY AUGUST 1977. DURING THE FIRST YEAR OF WORK A TEOM ESPECIALLY SUITED TO INCORPORATION IN A DICHOTOMOUS IMPACTOR WILL BE DEVELOPED. A COMPLETED TEOM-IMPACTOR SYSTEM IS EXPECTED TO BE AVAILABLE AND LABORATORY TESTED BY THE END OF THE SECOND YEAR.

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1978 NATIONAL CONFERENCE ON CONTROL OF HAZARDOUS MATERIAL SPILLS

    START/ COMPL DATE :    03/77 - 04/78 : FUNDING : EST. - FY   77  / $   25000
     TASK/EPA CODE :B610A-491    / R805223-01  (GRANT)  PRIOR  FY76 /          1
    PROJECT OFFICER : I    WILDER
    INVESTIGATORS :   D    USHER                     HAZARDOUS MTL. CONT. RES. INS
                      M    SHAYE                     HAZARDOUS MTL. CONT. RES. INS
    MILE: 03/77 -FUNDING PACKAGE SUBMITTED
          03/77 -AWARD FUNDS FOR PROJECT
          04/78 -HOLD 1978 NATIONAL HAZARDOUS SPILLS CONFERENCE
      A CONFERENCE WILL BE CONVENED IN MARCH 1978 ON CONTROL AND PREVENTION OF
      HAZARDOUS MATERIAL SPILLS. THE TOPICS TO BE PRESENTED INCLUDE; LEGISLATION
       AND REGULATIONS; CLEAN-UP SYSTEMS; INTERNATIONAL PROGRAMS; CONTINGENCY
       PLANNING; PREVENTION; GOVERNMENT POLICIES AND PROGRAMS; PERSONNEL SAFETY;
       SPILL RETRIEVAL DATA SYSTEMS; ULTIMATE DISPOSAL; DETE
      CTION-MONITORING-REPORTING; RESPONSE CAPABILITIES; RISK ANALYSIS; CASE HIS
      TORIES; EFFECTS AND IMPACTS; SPILL MOVEMENT; RESEARCH AND DEVELOPMENT; AND
      TRAINING.
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II- 382

"THIRTY-THREE TONS PER ACRE," A 23 MINUTE, 16MM SOUND FILM IN COLOR

START/ COMPL DATE : 05/77 - 07/78 : FUNDING : EST. - FY 77 / $ 52007
TASK/EPA CODE :L617A-03 / R805226 (GRANT) PRIOR FY / 1
PROJECT OFFICER : A G HORNSBY
INVESTIGATORS : R MORGAN UNKNOWN INST. OR INDIV. GRANT
MILE: 08/78 -FILM MASTER

"THIRTY-THREE TONS PER ACRE," IS AN INSTRUCTIONAL FILM FOR FARMERS AND IRRIGATORS ABOUT TOPSOIL EROSION ON IRRIGATED FARMLAND. THE PURPOSE OF THE FILM IS TO PROMOTE THE USE OF IRRIGATION METHODS AND CULTURAL PRACTICES THAT ARE EFFECTIVE IN CONTROLLING FURROW EROSION AND THE POLLUTION OF RECEIVING STREAMS. THE FILM IS TWENTY-THREE MINUTES LONG AND IN COLOR WITH SOUND. THE WORKING TITLE, THIRTY-THREE TONS PER ACRE, IS A REFERENCE TO THE AMOUNT OF SEDIMENT ERODED FROM A SINGLE FIELD SHOWN IN THE FILM DURING THE COURSE OF ONE IRRIGATING SEASON. THE PRIMARY TARGET AUDIENCE TO WHICH THE FILM IS DIRECTED IS MADE UP OF FARMERS, IRRIGATORS, IRRIGATION DISTRICTS, CANAL COMPANIES, AND AGRI-BUSINESS INTERESTS.

A SECONDARY TARGET AUDIENCE IS COMPOSED OF REPRESENTATIVES OF GOVERNMENTS, PRIVATE AND PUBLIC FINANCIAL INSTITUTIONS, AND AGRICULTURAL RESEARCH AND DESIGN CONCERNS. THE FILM HAS FOUR MAJOR OBJECTIVES: 1) TO INFORM THE TARGET AUDIENCE OF THE MAGNITUDE AND SIGNIFICANCE OF TOPSOIL LOSS AND RECEIVING STREAM POLLUTION DUE TO SURFACE IRRIGATION. 2) TO DEMONSTRATE INDIVIDUAL FINANCIAL LOSS RESULTING FROM IRRIGATION RELATED TOPSOIL EROSION. 3) TO STIMULATE FARMERS AND IRRIGATORS TO USE AVAILABLE TECHNOLOGY TO ESTABLISH EROSION CONTROL IRRIGATION PROGRAMS. 4) TO INFORM THE TARGET AUDIENCE OF CURRENT RESEARCH AND DEVELOPMENT IN EROSION CONTROL IRRIGATION METHODS AND TO ENCOURAGE RECEPTIVE ATTITUDES TOWARD IMPROVED IRRIGATION TECHNOLOGY.

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SULFUR DIOXIDE OXIDATION IN SCRUBBER SYSTEMS

   START/ COMPL DATE :    07/77 - 06/79 : FUNDING : EST. - FY   77  / $   79641
    TASK/EPA CODE :F624A-046    / R805227-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R H  BORGWARDT
   INVESTIGATORS :    J L HUDSON                      UNIV. OF VIRGINIA
   MILE: 09/77 -CONSTRUCT REACTOR AND ASSEMBLE APPARATUS
         11/77 -LOW LEVEL CATALYST STUDIES IN FLOW REACTOR
         02/78 -BISULFITE OXIDATION IN BATCH REACTOR
         06/78 -BISULFITE OXIDATION WITH MULTIPLE CATALYSTS
         09/78 -EFFECT OF OXIDATION INHIBITORS
         10/78 -CONCENTRATION EFFECTS
         09/78 -DEVELOP MODEL FOR OXIDATION IN SLURRIES
         06/79 -VERIFY MODEL
         08/79 -FINAL REPORT
    OBJECTIVES: 1) TO INVESTIGATE THE EFFECT OF CONTROLLABLE SYSTEM PARAMETERS
     IN LIME/LIMESTONE SCRUBBING SYSTEMS IN ORDER TO SUGGEST METHODS
    OF LIMITING OXIDATION TO PERMIT UNSATURATED OPERATION. SYSTEM PA
    RAMETERS INCLUDE THE CONCENTRATION AND TYPE OF INHIBITORS AND CATALYSTS AS
    WELL AS PHYSICAL FACTORS WHICH CONTROL MASS TRANSFER. 2) TO INVESTIGATE
    THE POSSIBILITY OF MAXIMIZING THE EFFICIENCY OF OXIDATION IN A HOLD TANK
    WHEN OXIDATION IS FORCED BY AERATION. FACTORS IMPORTANT HERE ARE MASS TRA
    NSFER (PARTICULARLY AS INFLUENCED BY AIR BUBBLE SIZE AND CONTACT TIME) AND
     THE KINETICS OF THE OXIDATION REACTION. APPROACH: CHEMICAL KINETICS
    AND MASS TRANSFER WILL BE STUDIED IN BOTH CLEAR SOLUTIONS AND SLURRIES
    USING STIRRED REACTORS AND FLOW REACTORS IN BENCH SCALE EQUIPMENT.
    THE RESULTS WILL BE INCORPORATED INTO A MATHEMATICAL MODEL TO PRODUCE
    METHODS OF MINIMIZING OR MAXIMIZING OXIDATION IN SCRUBBERS. PLANS: CO
    NSTRUCT REACTOR AND ASSEMBLE APPARATUS. STUDY OXIDATION OF BISULFITE AT PH
    4-6 IN FLOW REACTOR AND BATCH REACTOR WITH SINGLE AND MULTIPLE CATA
    LYSTS. EVALUATE OXIDATION INHIBITORS. STUDY OXIDATION OF SULFITE WITH HIGH
    CATALYST CONCENTRATIONS. DEVELOP MODEL FOR OXIDATION IN SLURRIES
    INCLUDING MASS TRANSFER AND KINETICS.
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THE USE OF ELECTROSTATICALLY CHARGED FOG FOR CONTROL OF DUST FROM OPEN SOURCES

START/ COMPL DATE : 06/77 - 06/79 : FUNDING : EST. - FY 77 / $ 50000
TASK/EPA CODE :F623A-34 / R805228 (GRANT) PRIOR FY / 1
PROJECT OFFICER : D C DREHMEL
INVESTIGATORS : S A HOENIG UNIV. OF ARIZONA
MILE: 06/77 -GRANT AWARD
06/78 -COMPLETE LABORATORY STUDY OF CONTROLLING PARAMETERS
06/79 -COMPLETE FIELD TESTS

OBJECTIVE: TO CONTINUE THE STUDIES OF INDUSTRIAL DUSTS AND FUMES AND THE DEVELOPMENT OF APPARATUS FOR INDUCING THESE POLLUTANTS TO AGGLOMERATE AND FALLOUT. ALSO TO INVESTIGATE THE PHENOMENA INVOLVED IN DUST/FUME CHARGING WITH THE HOPE OF PROVIDING BETTER DUST CONTROL SYSTEMS. APPROACH: THE STUDIES WILL BE PRIMARILY EXPERIMENTAL AND WILL GENERATE THE APPROPRIATE DUSTS AND FUMES UNDER CONTROLLED CONDITIONS TO DETERMINE THE PARAMETERS INVOLVED IN CHARGING PHENOMENA. UNIVERSITY OF ARIZONA WILL MAKE APPROPRIATE INDUSTRIAL MEASUREMENTS AND STUDIES TO EVALUATE CHARGING AND DUST CONTROL TECHNIQUES IN THE FACTORY ENVIRONMENT. CURRENT STATUS: UNIVERSITY OF ARIZONA HAS INVESTIGATED THE CHARGING BEHAVIOR OF A VARIETY OF DUSTS AND FUMES. MOST MATERIALS SEEM TO HAVE NEGATIVE CHARGES, AT LEAST FOR THE RESPIRABLE MATERIAL, BUT THERE ARE SOME NOTABLE EXCEPTIONS, I.E., MAGNETITE. IT HAS BEEN DEMONSTRATED THAT THESE DUSTS AND FUMES CAN BE INDUCED TO AGGLOMERATE AND FALLOUT WHEN EXPOSED TO PROPERLY CHARGED WATER FOG. A NUMBER OF INDUSTRIAL TESTS ARE UNDERWAY TO TEST PROTOTYPE FOG GENERATORS AS MECHANISMS FOR DUST CONTROL. UNIVERSITY OF ARIZONA HAS DONE SOME PRELIMINARY WORK ON CONTROL OF POWER PLANT FLY ASH AND COAL TAR VOLATILES (FROM COKE OVENS). HERE AGAIN IT APPEARS THAT THE CHARGED FOG SYSTEM HAS SIGNIFICANT POTENTIAL AS A CONTROL TECHNIQUE.

#-385

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ANALYSIS OF NUTRIENT AND TOXIC CHEMICAL FLUXES IN GREAT LAKES SEDIMENT

    START/ COMPL DATE :    03/77 - 03/80 : FUNDING : EST. - FY   77  / $  124253
     TASK/EPA CODE :N608A-009    / R805229     (GRANT)  PRIOR  FY   /          1
    PROJECT OFFICER : W L  RICHARDSON
    INVESTIGATORS :    D M DITORO                       MANHATTAN COLLEGE
                       J S JERIS                        MANHATTAN COLLEGE
                       W   MATYSTIC                     MANHATTAN COLLEGE
    MILE: 03/78 -FINALIZE QUANTITATIVE FRAMEWORK FOR MASS TRANSPORT IN SED.
          06/79 -APPLICATION OF FRAMEWORK TO LAKE ERIE EUTROPHICATION
          12/79 -INCORPORATE TOXIC SUBSTANCES IN MODEL
          03/80 -CONTINUE VERIFICATION AND IMPROVEMENT OF GREAT LAKE EUTROPHICAT
          06/80 -PREPARE FINAL PROJECT REPORT
      THE ANALYSIS OF NUTRIENT AND TOXIC CHEMICAL FLUXES IN SEDIMENT REQUIRE A
      SET OF MATHEMATICAL EQUATIONS WHICH DESCRIBE BOTH THE MASS TR
      ANSPORT OF THE MATERIAL VIA THE DISPERSION OF THE PORE WATERS AND THE DISS
      OLVED SPECIES AND THE SOLID PHASES OF THE SEDIMENT. IN ADDITION, IT IS NEC
      ESSARY TO FORMULATE AND TEST THE PROPER CHENICAL MODELS WHICH DESCRIBE THE
      INTERACTIONS BETWEEN THE DISSOLVED SPECIES AND SOLID PHASES, WHETHER
       THEY BE PRECIPITATIONS/DISSOLUTIONS OR ADSORPTIONS/DESOR
      PTIONS. IT IS THESE UNDERLYING THEORETICAL PROBLEMS AND THEIR APPLICATIONS
       TO GREAT LAKES PROBLEM SETTINGS WHICH ARE THE SUBJECT OF THE PROPO
      SED RESEARCH. THE GENERAL APPROACH WILL BE TO FORMULATE THE MASS TRANSPORT
       EQUATIONS TOGETHER WITH THE REVERSIBLE REACTIONS IN A GENERAL WAY.
      THE EQUATIONS WILL BE TRANSFORMED INTO A SET OF MUCH SMALLER AND SIMPLER
      EQUATIONS WHICH DO NOT EXPLICITLY CONTAIN THE REVERSIBLE REACTION
      KINETIC TERMS WHICH CAUSE COMPUTATIONAL DIFFICULTIES. THE TRANSFORMED
      EQUATIONS CAN THEN BE SOLVED NUMERICALLY OR ANALYTICALLY IN A SIMPLE AND S
      TRAIGHTFORWARD MANNER AND THE CHEMICAL EQUILIBRIA CALCULATIONS CAN ALSO BE
      DONE IN A STRAIGHTFORWARD MANNER USING CHEMICAL EQUILIBRIUM.
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II-386

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DEVELOPMENT OF IMPROVED ENUMERATION METHODS BASED ON PHYSIOLOGICAL
STUDIES OF INDICATOR BACTERIA DEBILITATION IN NATURAL WATERS
   START/ COMPL DATE :    00/00 - 00/00 : FUNDING : EST. - FY   77  / $   52000
    TASK/EPA CODE :A612A-40      / R805230-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : R     BORDNER
   INVESTIGATORS :     D G STUART                         MONTANA STATE UNIVERSITY
                       J E SCHILLINGER                    MONTANA STATE UNIVERSITY
                       G A MCFETERS                       MONTANA STATE UNIVERSITY
   MILE: 10/78 -PRELIMINARY REPORT
         10/79 -FINAL REPORT
     AQUATIC INJURY AND STRESS WILL BE INVESTIGATED IN FECAL AND NON-FECAL
     ESCHERICHIA COLI. PHYSIOLOGICAL STUDIES OF CELL FUNCTIONS WILL BE
      PERFORMED TO DETERMINE THE MODE OF ACTION OF BACTERIAL DEBILITATI
     ON. THIS INFORMATION WILL BE USED TO IMPROVE OR DEVISE ENUMERATION METHODS
     FOR BACTERIAL INDICATORS. EFFORTS WILL ALSO BE MADE TO RELATE DIFFERENT
     DEBILITATION POTENTIALS OF AQUATIC ENVIRONMENTS TO THEIR BIOPHYSICAL
     OR BIOCHEMICAL CAUSES. IMPROVED BACTERIAL INDICATOR METHODS WILL BE
     USED TO SHED LIGHT ON BACTERIAL COUNT COMPARISONS, BACTERIAL DIE-OFF RATES
     IN STREAMS PATHOGEN-INDICATOR CORRELATIONS, AND MAY LEAD TO NEW
     PATHOGEN RECOVERY TECHNIQUES AND STUDIES OF THE INFECTIVITY AND
     PATHOGENICITY OF STRESSED BACTERIA.
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805232

II-387

The development and application of identification and detection technology is proposed for evaluating the genetics of baculoviruses pesticides for recombination and mutation. This is being accomplished by use of restriction endonuclease fragment analysis, SDS-polyacrylamide gel electrophoresis and radioimmunoassay. With such techniques the ability to identify and monitor for baculovirus-host interaction and potential to undergo genetic change can be accomplished.

II-358

ARSENIC & SELENIUM IN INDUSTRIAL & DOMESTIC EFFLUENTS - APPLICABILITY OF THE PARR ACID DIGESTION BOMB TECHNIQUE FOR SAMPLE PRETREATME

START/ COMPL DATE : 09/77 - 09/78 : FUNDING : EST. - FY 77 / $ 42306
TASK/EPA CODE :A622B-03 / R805237-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : M GALES
INVESTIGATORS : J T KINARD BENEDICT COLLEGE
MILE: 09/78 -EVALUATE FIVE METHODS FOR ARSENIC AND SELENIUM
06/79 -TEST SELECTED AND MODIFIED METHOD ON INDUSTRIAL SAMPLES
08/79 -DRAFT FINAL REPORT
09/79 -FINAL REPORT

THIS RESEARCH COMPRISES A COMPARATIVE STUDY OF A NUMBER OF LEADING METHODS FOR THE DETERMINATION OF ARSENIC AND SELENIUM, AND SERVES TO DEMONSTRATE THE APPLICABILITY OF EACH FOR COMPLEX MATRICES THAT EXIST FOR SAMPLES SUCH AS INDUSTRIAL AND DOMESTIC EFFLUENTS. BY UTILIZING THE TECHNIQUES OF FLAME AND FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY IT SHOULD BE POSSIBLE TO EFFECT THE APPRAISAL OF VARIOUS SAMPLE PRETREATMENT PROCEDURES INCLUDING THE PARR ACID DIGESTION BOMB TECHNIQUE FOR THE DETERMINATION OF TOTAL ARSENIC AND SELENIUM IN EFFLUENTS CHARGED WITH A VARIETY OF THEIR ORGANIC AND INORGANIC SPECIES. AT THE CONCLUSION OF THIS INVESTIGATION THE MOST APPLICABLE HYDRIDE GENERATION-FLAME ATOMIC ABSORPTION SPECTROPHOTOMETRIC METHOD FOR DETERMINING ORGANIC AND INORGANIC ARSENIC AND SELENIUM IN AN INDUSTRIAL DOMESTIC-EFFLUENT MATRIX WILL HAVE BEEN IDENTIFIED. IN ADDITION, THE ADVANTAGES OF THIS METHOD AND THE GRAPHITE FURNACE METHOD, WHEN EMPLOYED FOR ROUTINE DETERMINATION OF TOTAL ARSENIC AND SELENIUM IN EFFLUENTS, WILL HAVE BEEN DETERMINED AND COMPARED. ALTHOUGH THIS INVESTIGATION IS HIGHLY SPECIFIC, IT ADDRESSES THE DETERMINATION OF TWO ELEMENTS THAT HAVE TOXICOLOGICAL AND PERHAPS CARCINOGENIC CHARACTERISTICS, AND EXIST IN FORMS THAT HAVE ELUDED TOTAL ANALYTICAL CHARACTERIZATION.

NEW RESIDENTIAL DEVELOPMENTS AND THE QUANTITY AND QUALITY OF RUNOFF

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START/ COMPL DATE :    07/77 - 11/78 : FUNDING : EST. - FY   77  / $   52117
 TASK/EPA CODE :C611A-7102   / R805238      (GRANT)  PRIOR  FY    /          1
PROJECT OFFICER : A N  TAFURI
INVESTIGATORS :   D F LUECKE                      META SYSTEMS INCORPORATED
                  T   CHI                         META SYSTEMS INCORPORATED
                  J   KUHNER                      META SYSTEMS INCORPORATED
                  S J ROBINSON                    META SYSTEMS INCORPORATED
                  P   ROGERS                      META SYSTEMS INCORPORATED
                  M   SHAPIRO                     META SYSTEMS INCORPORATED
MILE: 07/77 -START NEW COMMUNITY PLANNING STUDY
      08/78 -SUBMIT PLANNING GUIDELINE
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THE OBJECTIVE OF THE WORK IS THE DETERMINATION OF THE FEASIBILITY OF DEVELOPING SIMPLE PRODUCTION FUNCTIONS AND COST FUNCTIONS FOR CONTROL OF RUNOFF AND RESIDUALS ASSOCIATED WITH NEW RESIDENTIAL DEVELOPMENTS. THERE ARE SIX TASKS: 1. ESTIMATING RESIDUALS ACCUMULATION RATES AND ASSESSING THE RELATIONSHIP BETWEEN ACCUMULATION AND WASH OFF RATE. 2. IDENTIFYING OPTIONS FOR CONTROLLING STORM WATER QUALITY AT THE SUBDIVISION LEVEL. 3. EVALUATING METHODS FOR OBTAINING COST ESTIMATES (AND FUNCTIONS) FOR CONTROL OPTIONS. 4. EVALUATING COMMONLY USED HYDROLOGIC EVENTS AND PLANNING EVENTS USED IN SELECTING CONTROL OPTIONS AND SIZING CONTROL STRUCTURES. 5. REVIEWING THE USE OF RAINFALL-RUNOFF SIMULATION MODELS AS DATA GENERATORS. 6. DEVELOPING AN APPROACH TO CONSTRUCTING SIMPLE PRODUCTION FUNCTIONS AND COST FUNCTIONS.

CONTINUOUS TWIN SCREW ACID HYDROLYSIS REACTOR DEVELOPMENT AND OPTIMIZATION FOR ONE-TON DAY WASTE CELLULOSE GLUCOSE PILOT PL

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START/ COMPL DATE :    06/77 - 06/80 : FUNDING : EST, - FY   77  / $  212500
 TASK/EPA CODE :C624B-7043   / R805239-01  (GRANT)  PRIOR  FY76 / $   630001
PROJECT OFFICER : C    ROGERS
INVESTIGATORS :   W    BRENNER                     NEW YORK UNIVERSITY
                  B    RUGG                        NEW YORK UNIVERSITY
MILE: 06/77 -GRANT AWARDED
      07/77 -IDENTIFY ALL PERTINENT ACID HYDROLYSIS EQUIPMENT
      09/77 -PROCUREMENT AND INSTALLATION
      06/78 -OPTIMIZATION OF OPERATING CONDITIONS
      06/78 -PRODUCT QUALITY ANALYSIS
      09/78 -SCALE TO 10 TPD OPERATION
      06/79 -COMPLETE SCALED UP STUDIES
      09/79 -FINAL REPORT
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SOLID WASTE IS NOW RECOGNIZED AS BOTH A MAJOR PROBLEM AND A UNDERUTILIZED RENEWABLE RESOURCE FOR MATERIALS AND ENERGY RECOVERY, WHILE ACID HYDROLYSIS OF WASTE CELLULOSE IS POTENTIALLY VERY ATTRACTIVE BECAUSE CHEAP GLUCOSE WOULD BE A MOST USEFUL INTERMEDIATE FOR CHEMICALS AND ENERGY PRODUCTION, TECHNICAL PROBLEMS SUCH AS LOW GLUCOSE YIELDS AND LONG REACTION TIMES HAVE PREVENTED LARGE SCALE USAGE, EXPERIMENTS CARRIED OUT OVER THE LAST TWO YEARS AT NEW YORK UNIVERSITY HAVE DEMONSTRATED THAT SELECTED PRETREATMENT OF CELLULOSIC WASTES FOLLOWED BY A RAPID HIGH TEMPERATURE ACID HYDROLYSIS CAN READILY PRODUCE GLUCOSE YIELDS IN THE ORDER OF 50 PER CENT BASED ON THE AVAILABLE CELLULOSE CONTENT, EXPLORATORY STUDIES HAVE ALSO BEEN PERFORMED WITH A CONTINUOUS TWIN SCREW ACID HYDROLYSIS REACTOR, THE RESULTS STRONGLY SUPPORT THE TECHNICAL AND ECONOMIC VIABILITY OF THIS TYPE OF CONTINUOUS REACTOR FOR CARRYING OUT LARGE SCALE CONVERSION OF WASTE CELLULOSE TO GLUCOSE, A 3 YEAR PROGRAM OF EXPERIMENTAL INVESTIGATIONS IS HEREWITH PROPOSED ON THE ADDITIONAL DEVELOPMENT AND OPTIMIZATION OF THE CONTINUOUS TWIN SCREW ACID HYDROLYSIS REACTOR FOR THE ESTABLISHMENT AND OPERATION OF A ONE-TON/DAY WASTE CELLULOSE-GLUCOSE PILOT PLANT, THIS PROGRAM ENCOMPASSES; 1) THE IDENTIFICATION OF ALL PERTINENT ACID HYDROLYSIS EQUIPMENT; 2) PROCUREMENT AND INSTALLATION; 3) OPTIMIZATION OF OPERATING CONDITIONS INCLUDING WASTE CELLULOSE FEED PREPARATION AND GLUCOSE RECOVERY; 4) PRODUCT QUALITY ANALYSIS; AND 5) DETERMINATION OF ENVIRONMENTAL IMPACT WITH MAXIMUM ENERGY CONVERSION, FOR MOST EFFECTIVE UTILIZATION OF TIME AND MONEY, A PREVIOUSLY EVALUATED TWIN SCREW MACHINE WILL BE LEASED ON AN ANNUAL BASIS FOR THE ACID HYDROLYSIS REACTOR, INITIAL OPTIMIZATION WILL BE CARRIED OUT WITH WASTE NEWSPAPERS, THE EXPERIMENTAL WORK WILL BE SUPPLEMENTED BY A DETAILED ECONOMIC COST ANALYSIS WITH SUBSEQUENT PROJECTIONS FOR VARIOUS LARGER PRODUCTION SCALE-UPS.

II-391

TREATMENT COMPATIBILITY OF MUNICIPAL WASTES AND BIOLOGICALLY HAZARDOUS
INDUSTRIAL COMPOUNDS
START/ COMPL DATE :   07/77 - 07/79 : FUNDING : EST. - FY   77 / $ 174887
TASK/EPA CODE :L610F-17   / R805242   (GRANT) PRIOR FY   /   1
PROJECT OFFICER : T E SHORT
INVESTIGATORS :   A F GAUDY   OKLA. ST. UNIV.
                   D F KINCANNON   OKLA. ST. UNIV.
MILE: 07/77 -START PROJECT
      07/79 -COMPLETE PROJECT, FINAL REPORT WRITTEN

THE LIST OF INDUSTRIAL CHEMICALS PRESENTLY IDENTIFIED AS POTENTIALLY HAZARDOUS TO EFFLUENT QUALITY OF MUNICIPAL TREATMENT PLANTS IS RATHER LONG AND WILL PROBABLY GET LONGER, IT IS THE OBJECTIVE OF THIS RESEARCH TO DEVISE AND TEST METHODOLOGY FOR DETERMINING WHETHER VARIOUS LEVELS OF SUCH COMPOUNDS ARE COMPATIBLE WITH OR INTERFERE WITH THE TREATMENT OF MUNICIPAL WASTES BY THE ACTIVATED SLUDGE PROCESS, ANOTHER OBJECTIVE IS TO SCREEN COMPOUNDS FOR POTENTIAL INTERFERENCE AND/OR COMPATIBILITY. FOR EACH COMPOUND FULLY TESTED TWO LABORATORY SCALE CONTINUOUS FLOW PILOT PLANTS WILL BE FED SETTLED MUNICIPAL SEWAGE. AFTER ESTABLISHING IDENTICAL PERFORMANCE IN EACH SYSTEM ONE WILL SERVE AS A CONTROL WHILE THE OTHER WILL RECEIVE VARYING CONCENTRATIONS OF THE TEST COMPOUND IN ADDITION TO THE SEWAGE FEED. MANY TYPES OF ANALYTICAL DETERMINATIONS WILL BE EMPLOYED TO COMPARE BIOCHEMICAL PERFORMANCE AND SLUDGE SETTLEABILITY OF EACH SYSTEM. BATCH STUDIES USING BOTH SLUDGES WILL BE RUN TO DETERMINE IF IDENTICAL CONCLUSIONS AS TO COMPATIBILITY CAN BE DRAWN FROM BATCH AND CONTINUOUS FLOW PILOT PLANT STUDIES. SUCH COMPARISONS MAY LEAD TO MORE EASILY FACILITATED TESTING PROCEDURES. THE RESULTS OF THIS INVESTIGATION WOULD PROVIDE POSITIVE METHODS FOR MAKING REGULATORY DECISIONS REGARDING COMPATIBILITY AND/OR PRETREATMENT NEEDS.

II - 392

805244

The project is designed to organize and direct an International Conference on the Effects of Pollutants on High Risk Groups during the spring of 1978 at the University of Massachusetts, Amherst. Recognized authorities in the various areas will be invited to present their latest research concerning the identification and quantification of individuals at high risk to the toxic and/or carcinogenic effects of environmental/occupational pollutants. The following four specific objectives will be addressed:

1. The biological factors which predispose individuals to the toxic and/or carcinogenic effects of pollutants.

2. The role of high risk groups in both environmental and occupational standard setting.

3. The efficacy of screening tests.

4. Practical applications in environmental/occupational health policy.

805245

II-393

(1) Objectives: (a) to remove aquatic plants from Lake Bomoseen thereby making the lake more attractive for water related recreation activity, and (b) to permanently remove excessive amounts of nutrients thereby significantly reducinç the growth of aquatic plants in the future and improving both the chemical and aesthetic properties of the lake water.

(2) Approach: The Town of Castleton has purchased a weed harvesting machine which will be used to harvest aquatic plant growth during mid and late summer months. This application is for partial financial assistance for operating the machine for the first 3 years of the planned 5 year program.

(3) Plans/Progress: During the summer of 1975 the Town contracted with a private firm to harvest aquatic plant growth. The program was a great success and the lake property owners and the Vt. Dept. of Water Resources encouraged the Town to undertake a 5 year program to reduce nutrient loading. With the assistance of the Vt. Dept. of Water Resources which will conduct water quality studies/ monitoring, the Town plans on conducting two cuttings of the entire lake for a five year period.

II-394

DEVELOPMENT OF A MANUAL ON ALTERNATIVE IRRIGATION MANAGEMENT PRACTICES
AND THEIR EFFECTS ON THE ENVIRONMENT IN THE CENTRAL PLAINS

START/ COMPL DATE : 07/77 - 12/78 : FUNDING : EST. - FY 77 / $ 78382
TASK/EPA CODE :L617A-04 / R805249-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : A L WOOD
INVESTIGATORS : M W HALL UNIV. OF NEBRASKA
MILE: 12/78 -FINAL REPORT

THE OBJECTIVE OF THE PROPOSED PROJECT IS TO PRODUCE A MANUAL PROVIDING TECHNICAL GUIDANCE ON THE BEST AVAILABLE PRACTICES FOR CONTROLLING NON-POINT POLLUTION ASSOCIATED WITH IRRIGATION AGRICULTURE IN THE CENTRAL PLAINS. SPECIAL EMPHASIS WILL BE GIVEN TO THE IMPACT OF MANAGEMENT PRACTICES ON SUBSURFACE POLLUTION. THE MANUAL WILL CONSIDER: (1) THE IMPACT OF CURRENT PRACTICES IN IRRIGATION AGRICULTURE ON WATER POLLUTION, SPECIFICALLY NUTRIENTS, PESTICIDES AND SEDIMENT; (2) THE EFFECTS OF MANAGEMENT ALTERNATIVES TO CURRENT PRACTICES ON THE DISTRIBUTION OF THESE POLLUTANTS: AND (3) SOCIAL, LEGAL, INSTITUTIONAL, ECONOMIC AND PLANNING CONSIDERATIONS IN IMPLEMENTING MANAGEMENT ALTERNATIVES FOR CONTROL OF THESE POLLUTANTS IN IRRIGATION AGRICULTURE. INITIALLY, THE WORK WILL INVOLVE GATHERING EXISTING INFORMATION ON CURRENT PRACTICES AND PROCEDURES IN IRRIGATION AGRICULTURE IN RELATION TO NUTRIENT AND SEDIMENT LOSS. THE SECOND TASK WILL BE TO DEVELOP MANAGEMENT ALTERNATIVES TO CURRENT PRACTICES DESIGNED TO OPTIMIZE THE CONTROL OF POLLUTION FROM IRRIGATION AGRICULTURE. FOR EXAMPLE, THESE ALTERNATIVES MIGHT INCLUDE IRRIGATION SCHEDULING, WATER ALLOCATION, FERTILIZER APPLICATION SCHEDULING, CULTURAL MODIFICATIONS SUCH AS CONSERVATION TILLAGE, LAND SUITABILITY AND LAND USE CLASSIFICATION, AND THE ECONOMIC CONSIDERATIONS OF THESE ALTERNATIVES. THE THIRD PHASE OF THIS PROJECT WOULD ENCOMPASS THE DEVELOPMENT OF SOCIAL, LEGAL, INSTITUTIONAL, ECONOMIC AND PLANNING CONSIDERATIONS FOR ASSISTING IN THE IMPLEMENTATION OF THESE MANAGEMENT ALTERNATIVES.

#-395

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CANCER CAUSING IMPLICATIONS OF WATER CHLORINATION

   START/ COMPL DATE :    01/77 - 01/78 : FUNDING : EST. - FY   77  / $   88382
    TASK/EPA CODE :D6148-045     / R805254-01  (GRANT)  PRIOR  FY    /          1
   PROJECT OFFICER : L J  MCCABE
   INVESTIGATORS :    G    KUPCHIK                      CITY UNIVERSITY OF NEW YORK
                      M    ALAVANJA                     CITY UNIVERSITY OF NEW YORK
   MILE: 07/78 -REPORT
     BASED ON PREVIOUS RESEARCH WHICH INDICATED THAT FEMALES RESIDING IN AREAS
     SERVICED BY CHLORINATED WATER HAD HIGHER RISKS OF DYING OF
     GASTROINTESTINAL AND URINARY TRACT CANCER THAN THEIR COUNTERPARTS RECEIVI
     NG NON CHLORINATED WATER, IN THIS 10 YEAR RETROSPECTIVE CASE-CONTROL STUDY
     WE WILL LOOK AT A LARGER POPULATION TO FURTHER EXAMINE THIS IMPLIED
     RELATIONSHIP AND TO SEE IF GASTROINTESTINAL AND URINARY TRACT CANCER
     MORTALITY CAN BE RELATED TO URBAN OR RURAL RESIDENCE, MEAN INCOME, POP
     ULATION DENSITY, RAW WATER QUALITY, PH AND NITRATE CONCENTRATION AND COLOR
     OF THE FINISHED WATER,
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II-396

805256

To rehabilitate Ellis Lake by applying herbicide chemicals to eliminate excessive growth of hydrilla, dredging bottom sediments to deepen the lake and eliminate nutrients, and diverting storm water flow from the lake and bringing in higher quality river water.

805257 II-397

The objective of this project is to hold a national Agri-medical conference the need for which has arisen from a growing concern about the impart of pesticide regulations upon agricultural production, environmental protection, public health and welfare, and the involvement and interrelationships of the respective state and federal agencies. The primary objective of the conference is to provide an increased awareness, understanding and communication among the public agencies concerned.

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SOIL AND CROP MANAGEMENT SYSTEMS FOR TREATMENT, UTILIZATION, AND
DISPOSAL OF MUNICIPAL WASTE WATER AND SLUDGES
   START/ COMPL DATE :    06/77 - 05/79 : FUNDING : EST. - FY   77  / $  133050
    TASK/EPA CODE :L611C-55     / R805270-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : F E  LEACH
   INVESTIGATORS :   A E ERICKSON                     MICHIGAN STATE UNIVERSITY
   MILE: 06/77 -INITIATE PROJECT
         10/77 -1ST QUARTERLY REPORT
         01/78 -2ND QUARTERLY REPORT - EVALUATION OF NITRATE MIGRATION WITH INT
         07/78 -ANNUAL REPORT
         06/79 -FINAL REPORT
    THIS PROJECT IS THE SECOND YEAR OF A PREVIOUSLY FUNDED PROJECT UNDER
    SECTION 108 OF PL 92-500 BY REGION V. THE OBJECTIVES ARE: 1) OPTIMIZATION
    OF INTERCROPPING SYSTEM TO STRIP NITROGEN FROM WASTEWATER, 2) EVAL
    UATE THE SAFETY OF APPLYING METAL CONTAMINATED SLUDGES TO FIELDS RECEIVING
     WASTEWATERS, AND 3) MONITORING TO DETERMINE THE INFLUENCE OF SOIL
    PHASE ON THE ADSORPTION OF NUTRIENTS AND ORGANICS.
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II-399

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RESIDENCE TIME OF ANTHROPOGENIC POLLUTANTS AND LONG-RANGE TRANSPORT

    START/ COMPL DATE :    05/77 - 04/78 : FUNDING : EST. - FY   77  / $   40000
     TASK/EPA CODE :G603A-AD-17  / R805271-01  (GRANT)  PRIOR  FY   /          1
    PROJECT OFFICER : G    HOLZWORTH
    INVESTIGATORS :   E R REITER                  COLORADO STATE UNIVERSITY
                      T   HENMI                   COLORADO STATE UNIVERSITY
    MILE: 05/78 -PROGRESS REPORT
          05/79 -FINAL REPORT
      A LONG-RANGE TRANSPORT MODEL SUITABLE TO KEEP TRACK OF POLLUTANTS AT DISTA
      NCES FROM 10 TO THE SECOND POWER TO 10 TO THE THIRD POWER KM DOWNSTREAM OF
       LARGE INDUSTRIAL COMPLEXES IS UNDER DEVELOPMENT. IT IS THE PURPOSE OF TH
      IS RESEARCH PROPOSAL TO MAKE OUR TRANSPORT MODEL MORE COMPREHENSIVE AND TO
       STUDY VERTICAL TRANSPORT PROCESSES OF POLLUTANTS. OUR OBJECTIVES IN
      THIS STUDY ARE: 1) REFINEMENT OF THE LAGRANGIAN TRAJECTORY MODEL,
      INCLUDING CHEMICAL TRANSFORMATION TERMS AND IMPROVING PRECIPITATION SCA
      VENGING TERMS BASED ON A CLOUD-MODELING STUDY; (2) CLOUD-MODELING STUDY TO
       INVESTIGATE THE VERTICAL TRANSPORT OF POLLUTANTS BY CONVECTIVE
      CLOUDS AND THE DISTRIBUTION OF POLLUTANTS IN CLOUD AIR AND CLOUD WATER
       DROPLETS; 3) INCORPORATION INTO OUR MODEL OF POLLUTION TRANSPORT BY
      "DRY" CONVECTION INTO THE LAYERS ABOVE THE MEAN MIXING LAYER HEIGHT.
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II-400

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DESIGN AND PERFORMANCE OF HEAD-OF-HOLLOW FILLS--A SURFACE MINING &
RECLAMATION METHOD
   START/ COMPL DATE :    07/77 - 07/80 : FUNDING : EST. - FY   77  / $   67000
    TASK/EPA CODE :B623B-505    / R805272-01  (GRANT)  PRIOR  FY76 /          1
   PROJECT OFFICER : R C  WILMOTH
   INVESTIGATORS :   G R LAUGHLIN                        STATE DIV. OF SURFACE MINING
   MILE: 06/77 -FUNDING PACKAGE SUBMITTED
         07/77 -AWARD FUNDS FOR PROJECT
         07/78 -AWARD CONTINUATION
         07/79 -AWARD CONTINUATION
         07/80 -FINAL REPORT RECEIVED
    THE OBJECTIVE IS TO DESIGN AND CONSTRUCT HEAD-OF-HOLLOW FILLS USING
   ECONOMIC ENGINEERING CRITERIA AND TO DETERMINE THE EFFECTS OF THIS M
   INING/RECLAMATION METHOD ON THE ENVIRONMENT. THE STUDY INVOLVES MONITORING
   ENVIRONMENTAL PARAMETERS PRIOR TO DISTRIBUTION, DURING DISTURBANCE, AND A
   FTER COMPLETION OF CONSTRUCTION. THE PROGRAM WILL INVOLVE HILL-TOP REMOVAL
    AND VALLEY FILLS, EACH OF VARYING DESIGN. COST ANALYSES WILL BE
   CONDUCTED FOR EACH FILL DESIGN. SOILS ENGINEERING PARAMETERS INCLUDING
   SETTLEMENT AND STABILITY WILL BE DETERMINED AND ANALYZED DURING AND AFTER
   CONSTRUCTION.
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II-401

VENTILATORY RESPONSES OF FISH TO FLUCTUATING APPLICATIONS OF TOXICANTS

START/ COMPL DATE : 07/77 - 07/78 : FUNDING : EST. - FY 77 / $ 49525
TASK/EPA CODE :N608A-090 / R805274-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : W B HORNING
INVESTIGATORS : J CAIRNS VIRGINIA POLY. INST. & ST. U.
K L DICKSON VIRGINIA POLY. INST. & ST. U.
W H VANDERSCHALIE VIRGINIA POLY. INST. & ST. U.
MILE: 07/78 -FINAL REPORT

MUCH OF THE PUBLISHED INFORMATION ON THE EFFECTS OF TOXICANTS ON AQUATIC LIFE HAS BEEN DERIVED FROM EXPERIMENTS WHICH EXPOSED ORGANISMS TO CONSTANT TOXICANT LEVELS, EVEN THOUGH FEW TOXICANT SOURCES, SUCH AS INDUSTRIAL EFFLUENTS, STAY AT CONSTANT LEVELS FOR LONG PERIODS OF TIME. THE PRINCIPLE OBJECTIVE OF THIS PROJECT IS TO DETERMINE HOW THE EFFECTS OF A SUBLETHAL AMOUNT OF TOXICANT ON FISH VENTILATORY BEHAVIOR VARIES WITH THE PATTERN OF ITS APPLICATION. A MICROCOMPUTER WILL BE USED TO PRECISELY CONTROL TOXICANT LEVELS AND MONITOR FISH RESPONSES, INCLUDING BREATHING AND COUGHING RATES. FISH WILL BE EXPOSED IN DIFFERENT TESTS TO A PREVIOUSLY DETERMINED SUBLETHAL QUANTITY OF TOXICANT OVER A 96 HOUR TEST PERIOD. THE PATTERN OF APPLICATION OF THIS FIXED AMOUNT OF TOXICANT WILL BE EITHER CONSTANT, CONTINUALLY INCREASING, CONTINUALLY DECREASING, OSCILLATING ABOUT A MEAN LEVEL, OR INTRODUCED IN SHORT BURSTS OF HIGHER CONCENTRATION. THE CHANGE IN VENTILATORY ACTIVITY OF EACH FISH FROM ITS LEVEL PRIOR TO EXPOSURE TO THE TOXICANT WILL BE EVALUATED STATISTICALLY. CONCLUSIONS WILL BE DRAWN ON THE IMPLICATIONS OF THIS DATA FOR SETTING WASTE EFFLUENT DISCHARGE STANDARDS AND THE OPERATION OF BIOLOGICAL MONITORING SYSTEMS.

INFLUENCE OF METALLURGICAL & OPERATING VARIABLES ON SCALING & CORROSION
IN WATER REUSE, RECYCLING, & TREATMENT SYSTEMS IN STEEL PLANT

START/ COMPL DATE : 09/77 = 09/78 : FUNDING : EST. = FY 77 / $ 47915
TASK/EPA CODE :F610C=03 / R805278 (GRANT) PRIOR FY / 1
PROJECT OFFICER : N PLAKS
INVESTIGATORS : G R ST. PIERRE OHIO STATE UNIVERSITY
MILE: 09/77 =START GRANT
09/78 =COMPLETE GRANT

OBJECTIVE: THE OBJECTIVE OF THIS STUDY WILL BE TO OBTAIN INFORMATION NECESSARY FOR THE DEVELOPMENT AND EVALUATION OF NEW AND IMPROVED METHODS FOR THE PRACTICAL PREVENTION OF SCALING AND CORROSION IN STEELPLANT WASTEWATER REUSE, RECYCLING, AND TREATMENT SYSTEMS. APPROACH: THE PRINCIPAL INTERRELATIONSHIPS BETWEEN PROCESS VARIABLES, WATER QUALITY AND TEMPERATURE, SCALING AND CORROSION POTENTIALS, AND PRODUCT QUALITY WILL BE SUMMARIZED. AN EXPERIMENTAL PROGRAM WILL BE CONDUCTED TO DETERMINE THE NECESSARY THERMODYNAMIC, KINETIC, AND MORPHOLOGICAL DATA TO ANALYZE VARIOUS CONTROL METHODS. BASED ON THESE RESULTS, SEVERAL PROPOSED METHODS FOR THE CONTROL OF SCALING AND CORROSION IN STEELPLANT WASTEWATER WILL BE TESTED AND EVALUATED. THE RESULTS OF THIS STUDY WILL BE COMBINED WITH THOSE OF OTHER RELATED EFFORTS TO SUGGEST PRACTICAL PROCEDURES FOR PREVENTION OF SCALING AND CORROSION UNDER STEELPLANT WASTEWATER CONDITIONS. OUTPUT: A FINAL REPORT SUMMARIZING ALL EXPERIMENTAL RESULTS, TESTING, EVALUATION, AND RECOMMENDATIONS WILL BE PRESENTED.

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RESEARCH STUDY FOR CONTINUING DOCUMENTATION OF PURIFYING DOMESTIC SEWAGE
 BY USE OF AQUATIC PLANTS - KNOWN AS THE MPI SYSTEM
   START/ COMPL DATE :    09/77 - 08/79 : FUNDING : EST. - FY   77  / $   65000
    TASK/EPA CODE :C611B-7056   / R805279-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R F  LEWIS
   INVESTIGATORS :    J E OCONNOR                    MOULTON NIGUEL WATER DISTRICT
                      J E OCONNOR                    BIOLOGICAL WATER PURIF. INC.
   MILE: 07/77 -GRANT PACKAGE PROCESSED
         09/77 -GRANT AWARDED (TENTATIVE)
         06/78 -SUPPLEMENT AWARDED (TENTATIVE)
         06/79 -EXPERIMENTAL WORK COMPLETED
         12/79 -PROJECT COMPLETION
         03/80 -FINAL REPORT PUBLISHED
    OBJECTIVES OF THE PROJECT: 1. OBTAIN AND MONITOR PERFORMANCE DATA FOR A 12
     MONTH PERIOD OF A PROPERLY DESIGNED AND WELL OPERATED BIOLOGICAL
    WATER PURIFICATION PROCESS KNOWN AS THE MAX PLANCK INSTITUTE SYSTEM (MPI
     SYSTEM) FOR TREATMENT OF DOMESTIC WASTE SEWAGE. 2. ATTEMPT TO SATISFY HIG
    HEST LEVELS FOR THE QUALITY FOR WASTEWATER THAT ARE NOW ESTABLISHED BY THE
     FEDERAL GOVERNMENT AND THE CALIFORNIA WATER QUALITY CONTROL BOARD. 3.
    OBTAIN AND COLLECT DATA FOR THE EVALUATION OF THE RELIABILITY AND E
    FFECTIVENESS OF THE MPI SYSTEM IN (A) PURIFICATION OF RAW DOMESTIC SEWAGE,
     (B) TRANSFORMATION OF SLUDGE, AND (C) REMOVAL OF NUTRIENTS FROM SE
    CONDARY TREATMENT EFFLUENT. DATA WILL BE COLLECTED AND DOCUMENTED ON THE O
    PERATION AND PERFORMANCE OF A MULTI-TRENCH FACILITY, USING THE AQUATIC PLA
    NTS KNOWN AS PHRAGMITES (REED) AND SCIRPUS (BULRUSH) AS FOLLOWS: 1. RECORD
    SEWAGE INFLUENT AND EFFLUENT DAILY SHOWING VARIATIONS IN FLOW, AIR
    TEMPERATURE, SUNLIGHT, AND PRECIPITATION. 2. RECORD WATER QUA
    LITY WITH COMPOSITE SAMPLING EQUIPMENT AT 3 LOCATIONS DESIGNATED: INFLUENT
    FROM DOMESTIC SEWAGE LINES, EFFLUENT FROM FILTER TRENCHES, AND EFFLUENT
    FROM ELIMINATION TRENCHES. CERTIFIED LABORATORY TESTS WILL DETERMINE THE
    ABILITY OF THE MPI SYSTEM TO REMOVE ORGANIC, INORGANIC, AND
    PATHOGENIC POLLUTANTS, INCLUDING BOD AND TSS. RESULTS WILL BE EVALUATED TO
    DETERMINE RELIABILITY OF THIS SYSTEM IN THIS TRANSFORMATION OF SLUDGE AND
    RECLAMATION OF DOMESTIC WASTEWATER FOR FUTURE INSTALLATIONS BY SMALL
    MUNICIPALITIES AND OUTLYING AREAS OF LARGE COMMUNITIES.
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II-404

PHOSPHORUS INTERNAL LOADING IN SHAGAWA LAKE

START/ COMPL DATE !   06/77 - 06/79 ! FUNDING ! EST, - FY   77 / $ 100000
TASK/EPA CODE !M608A-016   / R805281-01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER ! D W SCHULTS
INVESTIGATORS !   D E ARMSTRONG   UNIV, OF WISCONSIN
MILE! 06/79 -FINAL REPORT

THIS INVESTIGATION IS TO EVALUATE THE FACTORS AND MECHANISMS CONTROLLING THE INTERNAL LOADING OF PHOSPHORUS IN SHAGAWA LAKE, AND TO ASSESS THE APPLICABILITY OF THE INFORMATION ON THE RESPONSE OF THE LAKE TO REDUCTION OF EXTERNAL PHOSPHORUS LOADING TO OTHER LAKES OF VARYING MORPHOMETRY AND SEDIMENT COMPOSITION.

II-405

EFFECTS OF CHROMIUM & NUTRIENT POLLUTANTS ON NATURAL PHYTOPLANKTON POPULATIONS

START/ COMPL DATE : 07/77 - 07/79 : FUNDING : EST. - FY 77 / $ 126989
TASK/EPA CODE :M608C-017 / R805282-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : D T SPECHT
INVESTIGATORS : L F SMALL OREGON STATE HIGHER EDUC. SYS
MILE: 07/79 -FINAL REPORT

THE OBJECTIVES OF THE PROPOSAL ARE TO STUDY THE RESPONSES OF ENDEMIC ESTUARINE AND NEARSHORE PHYTOPLANKTON POPULATIONS TO A VARIETY OF POLLUTANT ADDITIONS (EXCESS MAJOR AND MICRO-NUTRIENTS AND CHROMIUM) USING A SPECIAL ALGAL ASSAY TECHNIQUE PREVIOUSLY DEVELOPED BY THE PRINCIPAL INVESTIGATORS. SPECIFICALLY, THE FOLLOWING PROBLEMS WILL BE ADDRESSED: 1) DETERMINING FACTORS WHICH GOVERN GROWTH RATES, FINAL BIOMASS YIELDS, AND SPECIES COMPOSITION OF PHYTOPLANKTON POPULATION ENDEMIC TO YAQUINA BAY, OREGON, AND ENVIRONS; 2) RESPONSES OF THESE ENDEMIC POPULATIONS TO CHROMIUM AND EXCESS NUTRIENT LEVELS; 3) EFFECTS ON PHYTOPLANKTON POPULATIONS FROM REDUCED ZOOPLANKTER GRAZING DUE TO CHROMIUM TOXICITY; 4) BIOACCUMULATION OF CHROMIUM BY PHYTOPLANKTON AND ZOPLANKTON, AND, 5) THE EXTENT OF SEASONAL AND YEARLY BIOLOGICAL, CHEMICAL, AND PHYSICAL FLUCTUATION IN YAQUINA BAY AS A BASE FOR COMPARISON OF THE ABOVE RESULTS.

EFFECTS OF CHROMIUM AND NUTRIENT POLLUTANTS ON NATURAL PHYTOPLANKTON POPULATIONS

START/ COMPL DATE : 07/77 - 07/79 : FUNDING : EST. - FY 77 / $ 47864
TASK/EPA CODE :M627 -107 / R805282-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : D T SPECHT
INVESTIGATORS : L F SMALL
MILE: 07/79 -FINAL REPORT OREGON STATE HIGHER EDUC. SYS

THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THE OBJECTIVES OF THIS PROJECT ARE TO STUDY THE RESPONSES OF ENDEMIC ESTUARINE AND NEARSHORE PHYTOPLANKTON POPULATIONS TO A VARIETY OF POLLUTANT ADDITIONS (EXCESS MAJOR AND MICRO-NUTRIENTS AND CHROMIUM) USING A SPECIAL ALGAL ASSAY TECHNIQUE PREVIOUSLY DEVELOPED BY THE PRINCIPAL INVESTIGATORS. SPECIFICALLY, THE FOLLOWING PROBLEMS WILL BE ADDRESSED: 1) DETERMINING FACTORS WHICH GOVERN GROWTH RATES, FINAL BIOMASS YIELDS, AND SPECIES COMPOSITION OF PHYTOPLANKTON POPULATIONS ENDEMIC TO YAQUINA BAY, OREGON AND ENVIRONS; 2) RESPONSES OF THESE ENDEMIC POPULATIONS TO CHROMIUM AND EXCESS NUTRIENT LEVELS; 3) EFFECTS ON PHYTOPLANKTON POPULATIONS FROM REDUCED ZOOPLANKTON GRAZING DUE TO CHROMIUM TOXICITY; 4) BIOACCUMULATION OF CHROMIUM BY PHYTOPLANKTON AND ZOOPLANKTON; AND 5) THE EXTENT OF SEASONAL AND YEARLY BIOLOGICAL, CHEMICAL, AND PHYSICAL FLUCTUATION IN YAQUINA BAY AS A BASE FOR COMPARISON OF THE ABOVE RESULTS.

II-401

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DETERMINATION OF STATISTICAL METHODS TO IDENTIFY TROPHO-DYNAMICS
INVOLVEMENT IN RECOVERY
   START/ COMPL DATE :    07/77 - 07/79 : FUNDING : EST, - FY   77  / $  100000
    TASK/EPA CODE :M608C-018    / R805288-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R C  SWARTZ
   INVESTIGATORS :   R J LIVINGSTON                  STATE UNIVERSITY OF FLA, SYS.
   MILE: 07/79 -FINAL REPORT
     OBJECTIVES: 1, TO EVALUATE THE USE OF TROPHO-DYNAMIC ANALYSIS OF FOOD WEB
     RELATIONSHIPS IN DETERMINING THE RECOVERY OF A COASTAL ECOSYSTEM
      FOLLOWING POLLUTION ABATEMENT, 2, TO DEVELOP METHODS OF QUANTITATI
     VE SAMPLING AND STATISTICAL ANALYSIS OF FIELD COLLECTIONS WITH AN EMPHASIS
      ON SUCCESSIONAL CHANGES IN TROPHIC RELATIONSHIPS,
DEVELOPMENT & TESTING OF AN AUTOMATIC FISH TRACKING & MONITORING SYSTEM
FOR THE MONTICELLO ECOLOGICAL RESEARCH STATION, MONTICELLO, M
   START/ COMPL DATE :    07/77 - 06/79 : FUNDING : EST. - FY   77  / $   84913
    TASK/EPA CODE :N608A-091    / R805290-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : K E  HOKANSON
   INVESTIGATORS :    D B SINIFF                    UNIV. OF MINNESOTA
                      V B KUECHLE                   UNIV. OF MINNESOTA
   MILE: 08/77 -INITIATE FIELD MEASUREMENT OF ELECTROMAGNETIC RADIATION SYSTEM
         05/78 -INITIATE BIOLOGICAL ASSESSMENT OF PROTOTYPE TRANSDUCERS
         08/79 -PROJECT DRAFT FINAL REPORT
    THIS PROPOSAL SPECIFIES RESEARCH AND DEVELOPMENT WHICH WILL BE CARRIED OUT
     AT THE MONTICELLO ECOLOGICAL RESEARCH STATION, MONTICELLO,
    MINNESOTA, WHICH WILL BE DEVOTED TOWARDS THE INSTRUMENTATION OF
    CONTROLLED ENVIRONMENTAL CHANNELS WITH AUTOMATIC DATA RECORDING EQUIPMENT.
    THIS RESEARSCH AND DEVELOPMENT WILL PROVIDE INSTRUMENTATION TO POSITION
    FISH IN THE CHANNELS TO THE NEAREST 50 FEET. ADDITIONALLY, DATA ON
    ENVIRONMENTAL MEASUREMENTS SUCH AS TEMPERATURE AND OTHER POLLUTANT STRESS
    ES, AS MAY BE SPECIFIED, WILL BE RECORDED SIMULTANEOUSLY WITH THE POSITION
    OF THE FISH. POSITIONING WILL REQUIRE ATTACHMENT OF MINIATURE RADIO TAGS
     TO THE EXPERIMENTAL ANIMALS. SUBSEQUENT TO THE DEVELOPMENT OF THE
    AUTOMATIC DATA RECORDING SYSTEM THE PROPOSAL OUTLINES WORK TO EVALUATE THE
    EFFECTS OF THESE MINIATURE TRANSMITTERS ON THE FISH. WE PLAN TO COMPARE
    VARIOUS BEHAVIORAL AND PHYSIOLOGICAL PARAMETERS BETWEEN CONTROL AND
    RADIO TAGGED FISH USING SEVERAL ATTACHMENT PROCEDURES. IT IS IMPO
    RTANT THAT THIS WORK BE EXECUTED SINCE AT THE CURRENT TIME IT IS IMPOSSIBL
    E TO COMPLETELY SEPARATE EFFECTS OF INSTRUMENTATION FROM THE EFFECTS OF PO
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II-409

INFLUENCE OF EXTERNAL FACTORS OF TOXICITY OF IRON AND COPPER CYANIDE FORMS

START/ COMPL DATE : 07/77 - 07/78 : FUNDING : EST. - FY 77 / $ 31544
TASK/EPA CODE :N608A-092 / R805291-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : J E POLDOSKI
INVESTIGATORS : L L SMITH UNIV. OF MINNESOTA
S J BRODERIUS UNIV. OF MINNESOTA
I R ADELMAN UNIV. OF MINNESOTA
MILE: 07/78 -FINAL REPORT

THE OBJECTIVES OF THE PROPOSED RESEARCH ARE TO DETERMINE THE TOXICITY OF METALLOCYANIDE SOLUTIONS WITH SPECIAL REFERENCE TO IRON AND COPPER COMPOUNDS OF CYANIDE AS THEY ARE AFFECTED BY ENVIRONMENTAL PARAMETERS. A SECOND OBJECTIVE IS TO GIVE SPECIAL ATTENTION TO PHOTODECOMPOSITION. A THIRD OBJECTIVE WILL BE TO INVESTIGATE THE CHEMISTRY OF COPPER-CYANIDE COMPLEX SOLUTIONS TO HELP EVALUATE THE TOXICITY OF VARIOUS COPPER-CYANIDE COMPLEX FORMS. THE PLAN OF WORK WILL BE DIVIDED INTO TWO PHASES: THE FIRST WILL BE AN INVESTIGATION OF PHOTOLYSIS REACTIONS OF IRON CYANIDE AS AFFECTED BY VARIOUS FACTORS; THE SECOND WILL DEAL WITH THE CHEMISTRY OF CUPROUS AND CUPRIC CYANIDE COMPLEXES AND THE TOXICITY OF THE DICYANOCUPRATE ION TO THE FATHEAD MINNOW. AFTER THE EFFECT OF PHOTODEGENERATION IS DETERMINED CHEMICALLY, THE TOXICITY OF RESULTING COMPONENTS WILL BE DETERMINED. THE CHEMISTRY OF COPPERCYANIDE COMPLEX SOLUTIONS WILL BE INVESTIGATED BY SETTING SOLUTIONS IN WHICH CUPRIC OR CUPROUS COPPER AND SODIUM CYANIDE ARE COMBINED. THE RATES OF DISSOCIATION AND FORMATION OF THE CUPROUS CYANIDE COMPLEX ION AND THE HCN EQUILIBRIUM LEVELS IN SOLUTIONS OF VARYING TOTAL CYANIDE CONCENTRATION, OF PH, AND CYANIDE-TO-COPPER MOLAR RATIOS WILL THEN BE EXAMINED IN DETAIL.

II-410

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MOVEMENT AND FATE OF VIRUSES AND ORGANIC POLLUTANTS IN GROUNDWATER
DURING THE LAND TREATMENT OF WASTEWATER
   START/ COMPL DATE :    07/77 - 07/80 : FUNDING : EST. - FY   77  / $  149557
    TASK/EPA CODE :L609B-10      / R805292-10  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : J F  MCNABB
   INVESTIGATORS :   C P GERBA
                     J L MELNICK                    BAYLOR COLLEGE OF MEDICINE
                     S M GOYAL                      BAYLOR COLLEGE OF MEDICINE
                     C H WARD                       BAYLOR COLLEGE OF MEDICINE
                     F L ROE                        RICE UNIVERSITY
                     J E HUDSON                     RICE UNIVERSITY
  MILE: 07/80 -FINAL REPORT                         RICE UNIVERSITY
    THE PURPOSE OF THIS PROJECT IS TO INVESTIGATE THE MOVEMENT OF VIRAL PAT
   HOGENS AND ORGANIC POLLUTANTS FROM WASTEWATER INTO GROUND WATER DURING THE
   LAND APPLICATION OF WASTEWATER IN ORDER TO DEVELOP INFORMATION REQUIRED
   TO CONFIRM OR ADJUST EXISTING DESIGN AND OPERATION CRITERIA TO ASSURE THE
    PROTECTION OF GROUNDWATER ASSOCIATED WITH SOIL TREATMENT FACILITIES.
   SPECIFIC OBJECTIVES INCLUDE: (1) THE IDENTIFICATION AND QUANTIFICATION
   OF ORGANIC POLLUTANTS IN GROUNDWATER UNDERLYING SELECTED LAND APPLICATION
   SITES; (2) DETERMINATION OF THE EXTENT OF SLOW CHROMATOGRAPHIC MOVEMENT OF
    ORGANIC POLLUTANTS AND VIRUSES THROUGH SOIL INTO GROUNDWATER USING COLUMN
    STUDIES; (3) DETERMINATION OF THE MECHANISMS OF VIRUS REMOVAL DURING
   PASSAGE OF WASTEWATER THROUGH SOIL USING BATCH AND COLUMN STUDIES AND A
    VARIETY OF VIRUSES AND SOILS; (4) DETERMINATIONS OF THE SURVIVAL OF VIR
   USES IN SOIL UNDER VARIETY OF ENVIRONMENTAL CONDITIONS; AND (5) EVALUATION
    OF THE USE OF ENTEROVIRUS-LIKE BACTERIOPHAGES AS INDICATORS OF
   ANIMAL VIRUS BEHAVIOR IN GROUNDWATER.
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II-411

REACTION OF ACTIVATED CARBON WITH AQUEOUS CHLORINE AND OTHER DISINFECTING AGENTS

START/ COMPL DATE : 07/77 - 06/80 : FUNDING : EST. - FY 77 / $ 56435
TASK/EPA CODE :C614 -7174 / R805293-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : A A STEVENS
INVESTIGATORS : V L SNOEYINK UNIV. OF ILLINOIS
W H PIRKLE UNIV. OF ILLINOIS
MILE: 06/77 -GRANT AWARDED
06/78 -INTERIM REPORT
06/79 -INTERIM REPORT
06/80 -PROJECT COMPLETED
09/80 -FINAL REPORT PUBLISHED

ACTIVATED CARBON IS A REDUCING AGENT AND WHEN IT IS USED IN TREATMENT OF WATER SUPPLIES IT READILY REACTS WITH THE PREDISINFECTANT CHLORINE. IT IS LIKELY THAT IN ADDITION TO THE CHLORIDES WHICH RESULT FROM THIS REACTION, SOME TRACE CHLORINATED ORGANICS ALSO ARE PRODUCED OWING TO REACTION WITH ORGANICS ADSORBED ON THE CARBON AND THE CARBON ITSELF. THE OBJECTIVE OF THIS RESEARCH IS TO DETERMINE 1) THE NATURE OF THE CHLORINATED ORGANICS WHICH FORM WHEN CHLORINE IS CONTACTED WITH CARBON, 2) THE NATURE OF THE ORGANICS WHICH FORM WHEN OZONE AND CHLORINE DIOXIDE REACT WITH CARBON BECAUSE THESE DISINFECTANTS MAY REPLACE CHLORINE, AND 3) WAYS IN WHICH THE PRODUCTION OF HARMFUL COMPOUNDS CAN BE ELIMINATED IF SUCH ARE FORMED. LABORATORY SCALE EXPERIMENTS WILL BE CONDUCTED WITH GAS CHROMATOGRAPHY, LIQUID CHROMATOGRAPHY AND MASS SPECTROMETRY BEING USED TO ANALYZE THE ORGANICS. INITIAL EXPERIMENTATION WILL DEAL WITH THE CARBON-CHLORINE REACTIONS ONLY.

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REVIEW OF CONTROL TECHNOLOGIES FOR OPEN SOURCES OF PARTICULATE EMISSIONS

START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST. - FY   77  / $   40000
 TASK/EPA CODE :F623A-30     / R805294-01  (GRANT)  PRIOR  FY   /         1
PROJECT OFFICER : D C  DREHMEL
INVESTIGATORS :    D W COOPER                      HARVARD UNIVERSITY
                   D W MOELLER                     HARVARD UNIVERSITY
MILE: 07/77 -AWARD GRANT
      07/78 -COMPLETE RANKING OF CONTROL TECHNOLOGY
  OBJECTIVE: TO ASSESS CONTROL TECHNOLOGY FOR OPEN SOURCES. APPROACH: THIS
  WORK WILL IDENTIFY, DESCRIBE, AND ANALYZE EXISTING METHODS FOR THE
  CONTROL OF OPEN SOURCES OF PARTICULATE EMISSIONS. FROM THE ANALYSIS OF
  THE STATE OF THE ART AND OF THE AREAS OF NEED, THE INVESTIGATORS WILL
   DETERMINE PRIORITIES FOR RESEARCH, DEVELOPMENT, AND APPLICATION IN
  THE CONTROL OF OPEN SOURCE EMISSIONS. OUTPUT: REVIEW AND RANKING OF
  OPEN SOURCE CONTROL PROCEDURES AND DEVICES.
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II-413

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LAGOON EFFLUENT POLISHING USING PHASE ISOLATION PONDS

    START/ COMPL DATE :    09/77 - 06/79 : FUNDING : EST. - FY   77  / $   65000
     TASK/EPA CODE :C611B-7044    / R805296-01  (GRANT)  PRIOR  FY   /         1
    PROJECT OFFICER : R F  LEWIS
    INVESTIGATORS :    E C MCGRIFF                    CLINTON CITY GOVERNMENT
                       E C MCGRIFF                    ENVIRONMENTAL PROT. SYST. INC
    MILE: 07/77 -GRANT PACKAGE PROCESSED
          09/77 -GRANT AWARDED (TENTATIVE)
          06/78 -SUPPLEMENT AWARDED (TENTATIVE)
          06/79 -EXPERIMENTAL WORK COMPLETED
          12/79 -PROJECT COMPLETION
          03/80 -FINAL REPORT PUBLISHED
     THE OBJECTIVE OF THIS RESEARCH PROJECT IS TO TEST THE "PHASE ISOLATION" CO
     NCEPT FOR REMOVAL OF ALGAE FROM SEWAGE LAGOON EFFLUENT THAT WAS NOTICED AT
      THE WOODLAND, CALIFORNIA WASTEWATER TREATMENT PLANT. RESEARCH ON AL
     GAE WASTEWATER TREATMENT SYSTEMS IN THE LABORATORY AND SOME FIELD OBSERVAT
     IONS HAVE SHOWN THAT WHEN ALGAE AGE WITHOUT NUTRIENTS THEY TEND TO CLUMP A
     ND SEPARATE FROM THE LIQUID BY SEDIMENTATION. THIS FULL-SCALE PROJECT WILL
      USE TWO ALTERNATIVELY LOADED FOUR ACRE RADIATION PONDS FOLLOWING A TW
     O-CELLED LAGOON WASTEWATER TREATMENT SYSTEM. THE PROJECT WILL CONSIST OF A
      CONSTRUCTION PHASE IN WHICH THE PRESENT FOUR CELLED LAGOON SYSTEM
      WILL BE MODIFIED TO ENABLE THE ALTERNATE LOADING, ISOLATION, AND DIS
     CHARGE OF THE TWO CELLS TO BE USED AS "PHASE ISOLATION" CELLS AND A TEST P
     ERIOD WHERE THE ISOLATION METHOD WILL BE USED WHILE EXTENSIVE SAMPLING AND
     ANALYTICAL WORK WILL BE CARRIED OUT TO DETERMINE THE EFFECTIVENESS OF
     THIS METHOD AND FACTORS THAT WILL INFLUENCE THE PROCESS.
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A STUDY OF CANCER AND THE PUBLIC DRINKING WATER SUPPLIES IN MISSOURI

   START/ COMPL DATE :    06/77 - 06/82 : FUNDING : EST. - FY   77  / $  155095
    TASK/EPA CODE :D614B-067     / R805297-01  (GRANT)  PRIOR  FY   /          1
   INVESTIGATORS :    C J MARIENFELD                   UNIV. OF MISSOURI
                      W   LOWER                        UNIV. OF MISSOURI
                      R   LOEPPKY                      UNIV. OF MISSOURI
                      G   OSWEILER                     UNIV. OF MISSOURI
                      C   GOWANS                       UNIV. OF MISSOURI
                      G   BARTLING                     UNIV. OF MISSOURI
                      R   MILLERS                      STATE WATER SUPPLY DIV.
  MILE: 07/78 -REPORT
        07/79 -REPORT
        07/80 -REPORT
        07/81 -REPORT
        07/82 -REPORT
    ESTABLISHMENT AND MAINTENANCE OF A STATEWIDE SURVEILLANCE SYSTEM FOR HUMAN
     CANCER INCIDENCE IN RELATIONSHIP TO THE MULTIPLE SOUCES OF COMMUN
    ITY PUBLIC WATER SUPPLIES IN MISSOURI AND THE METHODS OF TREATMENT OF SUCH
    LOCAL WATER SUPPLIES. USING THE AVAILABLE MORTALITY AND MORBIDITY DATA, A
     COMPUTERIZED RURAL ROUTE GEOCODING SYSTEM WILL BE USED TO LOCATE THE
    RESIDENCE OF THE AFFECTED INDIVIDUALS IDENTIFIED AS A PART OF THE
    POPULATION AT RISK WITHIN THE GEOGRAPHIC WATER SUPPLIED AREA.
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ION CHROMATOGRAPHY OF AROMATIC AMINES

START/ COMPL DATE : 07/77 - 07/78 : FUNDING : EST. - FY 77 / $ 44188
TASK/EPA CODE :G712B-BE-06 / R805298-01 (GRANT) PRIOR FY76 / $ 260001
PROJECT OFFICER : J MULIK
INVESTIGATORS : J O FROHLIGER UNIV. OF PITTSBURGH
MILE: 03/79 -FINAL REPORT

THE OBJECTIVE OF THIS RESEARCH PROJECT IS TO DEVELOP A LIQUID CHROMATOGRAPHIC METHOD FOR THE SEPARATION AND ANALYSIS OF AMINES FOUND IN ENVIRONMENTAL SAMPLES. THE LIQUID CHROMATOGRAPHIC METHOD TO BE UTILIZED IS A MODIFICATION OF ION CHROMATOGRAPHY AS DESCRIBED BY SMALL THE AMINES TO BE EXAMINED ARE AROMATIC AMINES, MANY OF WHICH ARE KNOWN OR SUSPECTED CARCINOGENS. THE ENVIRONMENTAL SAMPLES TO BE UTILIZED WILL BE OBTAINED ON HI-VOLUME FILTERS. THESE FILTERS WILL BE COLLECTED IN THE VICINITY OF SOURCES OF AMINES SUCH AS COKE WORKS AND DYE MANUFACTURING FACILITIES. EMISSIONS FROM THESE TYPES OF SOURCES HAVE BEEN IMPLICATED IN LUNG AND BLADDER CANCERS.

FIELD DEMONSTRATION OF NEW R.O. MEMBRANES FOR PLATING WASTE-TREATMENT

START/ COMPL DATE : 05/77 - 10/78 : FUNDING : EST. - FY 77 / $ 83000
TASK/EPA CODE :B610B-453 / R805300-01 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : M STINSON
INVESTIGATORS : J H SCHUMACHER AMER. ELECTROPLATERS SOC. INC
MILE: 05/77 -FUNDING PACKAGE SUBMITTED
06/77 -AWARD FUNDS FOR PROJECT
10/78 -FINAL REPORT RECEIVED

OBJECTIVE: THE OBJECTIVE OF THE PROPOSED PROGRAM IS TO DEMONSTRATE CLOSED-LOOP RECOVERY OF RINSEWATERS FROM BATHS WITH EXTREME PH'S OR HIGH OXIDANT LEVELS USING THE MOST PROMISING MEMBRANES IN FULL-SCALE MODULAR FORM. A MOBILE DEMONSTRATION SYSTEM WILL BE ASSEMBLED AND FIELD TESTED AT TWO DIFFERENT SITES. A COMBINED REVERSE OSMOSIS/EVAPORATION SYSTEM WILL BE USED TO PERMIT CLOSED-LOOP RINSEWATER RECOVERY FOR LOW TEMPERATURE BATHS. APPROACH: THE PROPOSED PROGRAM CONSISTS OF FOUR MAJOR TASKS: TASK 1: DESIGN AND ASSEMBLE MOBILE DEMONSTRATION SYSTEM. SYSTEM WILL BE SKID-MOUNTED FOR EASY TRANSPORTATION. COMMERCIAL EVAPORATOR WILL BE LEASED AND ADDED TO RO SYSTEM. TASK 2: DEMONSTRATE CLOSED-LOOP RECOVERY OF ALKALINE ZINC CYANIDE RINSEWATER, AT THE SELECTED PLATING FACILITY. DEMONSTRATION TO BE CONDUCTED OVER FOUR-MONTHS PERIOD. DATA TO BE OBTAINED FOR ASSESSING SYSTEM PERFORMANCE AND ECONOMICS. TASK 3: RETURN OF MOBILE DEMONSTRATION SYSTEM TO ABCOR, INC. FOR REFURBISHING AND MODIFICATION. TASK 4: DEMONSTRATE CLOSED-LOOP RECOVERY OF ACIDIC ACID COPPER RINSE WATER AND, IF POSSIBLE, OF CHROMIC ACID RINSEWATER AT THE SELECTED PLATING FACILITY. DEMONSTRATION TO BE CONDUCTED OVER FOUR-MONTHS PERIOD. DATA TO BE OBTAINED FOR ASSESSING SYSTEM PERFORMANCE AND ECONOMICS.

II-417

805301

The major objective of this research is to study the effects of prenatal exposure to one or more pesticides, herbicides and/or fungicides on the cardiovascular physiology of rats. Specifically, (1) rate of heartbeat; (2) electrocardiogram; (3) blood pressure; and (4) blood chemistry (hematocrit, Na, K, glucose, osmotic pressure and other items as indicated) will be studied in rat embryos, fetuses and newborns. Testing will begin shortly after maternal exposure to test for immediate effects and at later intervals to test for prolonged effects. The proposed program would provide more subtle and sensitive indicators of developmental toxicity than most of the standard teratological tests now generally used. Another objective of this research is to obtain some basic information on possible mechanisms of the physiological action of pesticides on fetuses.

The agents used initially will be those which have been shown to have some teratogenic potential in mammals. Particular emphasis will be given to Maneb, Mirex, 2,4,-D, Dioxin and Kepone which have also been reported to induce edematous changes in fetuses, an obvious sign of fluid imbalance.

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ORGANIC EMISSIONS FROM SINTER PLANTS - DETERMINATION OF CAUSES AND
METHODS OF ABATEMENT
   START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST, - FY   77  / $    9456
    TASK/EPA CODE :F604C-07      / R805304      (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : N    PLAKS
   INVESTIGATORS :   R A STOEHR                         UNIV, OF PITTSBURGH
   MILE: 07/77 -START GRANT
         07/76 -COMPLETE GRANT
     OBJECTIVE: PROVIDE BASIC DATA ON THE MECHANISMS AND POTENTIAL CONTROL OF
     ORGANICS AND HYDROCARBONS FROM SINTERING IN THE STEELMAKING INDUSTRY,
     APPROACH: THIS WORK WILL SYSTEMATICALLY EVALUATE AT BENCH-SCALE APPROACH
     ES TO ELIMINATING ORGANIC AND HYDROCARBON EMISSIONS FROM SINTERING BY: (A)
      RECYCLE OF GASES THROUGH A SECOND SINTER BED; (B) ELIMINATION OF P
     REVIOUSLY IDENTIFIED ORGANICS AND HYDROCARBONS FROM THE SINTER CHARGE; (C)
     CONTROL OF COMBUSTION CONDITIONS TO ACHIEVE MORE COMPLETE OXIDATION OF THE
     ORGANICS AND HYDROCARBONS; AND (D) PERIODIC REVERSAL OF AIR FLOW THROUGH
     THE BED, OUTPUT: THE OUTPUT WILL BE A FINAL REPORT,
EFFECTIVENESS AND COST OF ACTIVATED CARBON ADSORPTION OF TOXIC COMPOUNDS
 FROM PETROLEUM REFINERY WASTEWATERS
   START/ COMPL DATE :    08/77 - 07/78 : FUNDING : EST. - FY   77  / $   41746
    TASK/EPA CODE :L610C-20     / R805307-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : J E  MATTHEWS
   INVESTIGATORS :   S L BURKS                        OKLA. ST. UNIV.
   MILE: 08/77 -START PROJECT
         07/78 -COMPLETE PROJECT - FINAL REPORT
    A STUDY WILL BE CONDUCTED TO DETERMINE THE ADSORPTION CAPACITY OF ACT
    IVATED CARBON FOR SPECIFIC TOXIC ORGANIC COMPOUNDS IDENTIFIED IN PETROLEUM
     REFINERY WASTEWATERS. ADSORPTION ISOTHERMS AND COLUMN BREAKTHROUGH
    DATA ON THE SPECIFIC TOXIC COMPOUNDS WILL BE UTILIZED TO PREDICT THE
     EFFECTIVENESS OF CARBON ADSORPTION TREATMENT AND THE PROJECTED COST
    OF A FULL SCALE TREATMENT PLANT. IN ADDITION, FATHEAD MINNOW AND
    BENTHIC MACROINVERTEBRATE CONTINUOUS-FLOW BIOASSAYS OF CARBON TREATED PE
    TROLEUM REFINERY WASTEWATERS WILL BE PERFORMED TO DETERMINE THE CAPABILITY
     OF CARBON TREATMENT TO PRODUCE A "ZERO-TOXIC-POLLUTANT" DISCHARGE.
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II-420

TREATMENT OF GASEOUS EMISSIONS FROM STEEL PLANTS CONTAINING SMALL
CONCENTRATIONS OF HYDROCARBON VAPORS
START/ COMPL DATE : 07/77 - 07/78 : FUNDING : EST. - FY 77 / $ 10000
TASK/EPA CODE :F604C-08 / R805311 (GRANT) PRIOR FY / 1
PROJECT OFFICER : N PLAKS
INVESTIGATORS : J SZEKELY MASS. INST. OF TECHNOLOGY
MILE: 07/77 -START GRANT
07/78 -COMPLETE GRANT

OBJECTIVE: DEVELOP TECHNOLOGY FOR THE SELECTIVE ADSORPTION OF STEELMAKING PROCESSES SUCH AS SINTER PLANTS, COKEMAKING, ETC. APPROACH: THE PROJECT PROCEEDS IN A LOGICAL MANNER BY FIRST DEVELOPING ADSORPTION EQUILIBRIUM FOR SEVERAL ADSORBENTS AND HYDROCARBONS AND THEN BY SYSTEMATICALLY TRYING TO INCREASE THE SPECIFICITY OF ADSORPTION FOR HYDROCARBONS. SIMULTANEOUSLY, DATA WILL BE DEVELOPED ON REGENERATION OF THE ADSORBENTS. THE CONTROLLING MECHANISMS FOR THE PROCESS, MASS TRANSFER, PORE DIFFUSTION, OR ADSORPTION KINETICS, WILL BE DETERMINED FOR USE IN SCALE-UP PURPOSES. FINALLY, THE RESULTS WILL BE EXTENDED TO ENCOMPASS MULTI-COMPONENT SYSTEMS. OUPUT: THE OUTPUT WILL BE A FINAL REPORT.

II-421

CALIBRATION OF 90 DEGREES V-NOTCH WEIRS USING PARAMETERS OTHER THAN WEIR HEAD

START/ COMPL DATE : 00/00 - 00/00 : FUNDING : EST. - FY 77 / $ 22328
TASK/EPA CODE :A621A-60 / R805312-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : T C COVEW
INVESTIGATORS : R N ELI WEST VA, UNIVERSITY
MILE: 00/00 -FINAL REPORT

THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THE OBJECT OF THE PROPOSED RESEARCH IS TO DEVELOP, BY MEANS OF A LABORATORY INVESTIGATION, A LESS CUMBERSOME AND MORE ACCURATE MEANS OF DETERMINING DISCHARGE OVER A 90 DEGREES V-NOTCH WEIR BY TAKING DIRECT MEASUREMENTS AT THE WEIR PLATE. COMPLIANCE MONITORING IN CONNECTION WITH NPDES PERMITS REQUIRES A PROCEDURE, THAT CAN BE EASILY APPLIED IN THE FIELD WITH A MINIMUM OF TOOLS OR INSTRUMENTATION. WEIR HEAD, THE LEVEL POOL HEAD ABOVE THE WEIR CREST, IS A DIFFICULT MEASUREMENT TO MAKE SINCE IT MUST BE MADE SOME DISTANCE UPSTREAM OF THE CREST. THEREFORE, THE MAIN THRUST OF THE INVESTIGATION WILL BE TO SELECT A NEW PARAMETER THAT CAN BE MEASURED IN THE VICINITY OF THE WEIR PLATE. THE NEW PARAMETER IS TO BE RELATED TO DISCHARGE BY DEFINING AN EMPIRICAL RELATIONSHIP BY MEANS OF CALIBRATION TESTS TO BE CONDUCTED OVER THE DISCHARGE RANGE OF APPROXIMATELY 0 TO 5 CUBIC FEET PER SECOND. DRAWDOWN OF THE WATER SURFACE IN THE VICINITY OF THE WEIR PLATE WILL REQUIRE CAREFUL DEFINITION OF THE NEW MEASUREMENT PARAMETER.

II-422

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CALIBRATION OF 90 DEGREES V-NOTCH WEIRS USING PARAMETERS OTHER THAN WEIR
 HEAD
   START/ COMPL DATE :    09/77 - 09/78 : FUNDING : EST. - FY   77  / $   22328
    TASK/EPA CODE :A621C-26      / R805312-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : E    BERG
   INVESTIGATORS :   R N ELI                       WEST VA. UNIVERSITY
   MILE: 10/78 -REPORT ON NEW PARAMETERS TO MEASURE FLOW THRU 90 DEGREE V-NOTCH
     THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO DEVELOP, BY MEANS OF A
     LABORATORY INVESTIGATION, A LESS CUMBERSOME AND MORE ACCURATE MEANS OF
     DETERMINING DISCHARGE OVER A 90 DEGREES V-NOTCH WEIR BY TAKING DIRECT MEAS
     UREMENTS AT THE WEIR PLATE. COMPLIANCE MONITORING IN CONNECTION WITH NPDES
      PERMITS REQUIRES A PROCEDURE THAT CAN BE EASILY APPLIED IN THE FIELD
     WITH A MINIMUM OF TOOLS OR INSTRUMENTATION. WEIR HEAD, THE LEVEL POOL
     HEAD ABOVE THE WEIR CREST, IS A DIFFICULT MEASUREMENT TO MAKE SINCE IT MU
     ST BE MADE SOME DISTANCE UPSTREAM OF THE CREST. THEREFORE, THE MAIN THRUST
     OF THE INVESTIGATION WILL BE TO SELECT A NEW PARAMETER THAT CAN BE
     MEASURED IN THE VICINITY OF THE WEIR PLATE. THE NEW PARAMETER IS TO BE
     RELATED TO DISCHARGE BY DEFINING AN EMPIRICAL RELATIONSHIP BY MEANS OF CAL
     IBRATION TESTS TO BE CONDUCTED OVER THE DISCHARGE RANGE OF APPROXIMATELY 0
     TO 5 CUBIC FEET PER SECOND. DRAWDOWN OF THE WATER SURFACE IN THE
     VICINITY OF THE WEIR PLATE WILL REQUIRE CAREFUL DEFINITION OF THE NEW
     MEASUREMENT PARAMETER.
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IDENTIFICATION AND PREVALENCE OF YERSINIA ENTEROCOLITICA IN WASHINGTON
STATE WATER SUPPLIES
START/ COMPL DATE : 06/77 - 06/80 : FUNDING : EST. - FY 77 / $ 41500
TASK/EPA CODE :D614B-027 / R805313-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : W JAKUBOWSKI
INVESTIGATORS : T F WETZLER UNIV. OF WASHINGTON
MILE: 06/78 -ANNUAL REPORT
06/79 -ANNUAL REPORT
06/80 -FINAL REPORT

THE RESEARCH GOALS INVOLVE A STATE-WIDE SURVEY OF SELECTED WATER SOURCES UTILIZED FOR OVER 50 METROPOLITAN/URBAN WATER SYSTEMS. WATERS ARE UNTREATED, TREATED, AND/OR CHLORINATED. SANITARY MICROBIOLOGY WILL BE PERFORMED ON SOME 130 SAMPLES PER MONTHS FOR 12 MONTHS TO INCLUDE: AEROBIC PLATE COUNT, TOTAL COLIFORM, FECAL STREPTOCOCCI AND PRESENCE OF ENTERIC PATHOGENS, ESPECIALLY YERSINIA ENTEROCOLITICA. ISOLATES OF YERSINIA ENTEROCOLITICA WILL BE CAREFULLY IDENTIFIED BIOCHEMICALLY, BIOTYPED BY WAUTER'S SYSTEM AND SEROTYPING. NON-TYPABLE ISOLATES WILL SERVE AS A STARTING POINT FOR THE EXPANSION OF NEW SEROTYPES BEYOND THE 36 RECOGNIZED TODAY. VIRULENCE STUDIES WILL BE CARRIED OUT IN MICE ON ALL ISOLATES; AND SOME LIMITED DATA WILL BE ACCULULATED ON HALGEN DISINFECTION PARAMETERS: IONIC STATE, CONCENTRATION, TIME, TEMPERATURE, ETC. EPIDEMIOLOGIC STUDIES WILL STRIVE TO IDENTIFY HUMAN CASES OF YERSINIOSIS AND CORRELATE DATA TO THE POTENTIAL OF WATER- OR FOOD-BORNE TRANSMISSION.

II-424

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HELMINTH TRANSMISSION IN ANAEROBICALLY DIGESTED SEWAGE SLUDGE

    START/ COMPL DATE :    07/77 - 09/78 : FUNDING : EST. - FY   77  / $  185885
     TASK/EPA CODE :C611B-7082   / R805315-01  (GRANT)  PRIOR  FY   /          1
    PROJECT OFFICER : G    STERN
    INVESTIGATORS :   P R FITZGERALD                  UNIV. OF ILLINOIS
                      R   ARTHER                      UNIV. OF ILLINOIS
                      B   WHEAT                       UNIV. OF ILLINOIS
    MILE: 10/77 -PROJECT STARTED
          09/79 -PROJECT COMPLETED
          03/80 -REPORT PUBLISHED
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OBJECTIVES: 1) DETERMINE THE PRACTICAL SURVIVAL OF RESISTANT PARASITES DISPERSED ON AGRICULTURAL LANDS IN ANAEROBICALLY DIGESTED SLUDGE WITH POSSIBLE INFECTION OF TARGET HOST SPECIES. 2) DETERMINE THE RATES OF SURVIVAL OF HELMINTH PARASITES IN ANAEROBICALLY DIGESTED SLUDGE, AND RESIDUES, E.G., "NU-EARTH." 3) DETERMINE LEVELS OF HEAVY METALS IN SOILS, FEED AND TISSUES OF SWINE EXPOSED TO ANAEROBICALLY DIGESTED SLUDGE SPREAD ON AGRICULTURAL LANDS. 4) DETERMINE THE EFFECTS OF HEAVY METALS AND FLUORIDES IN SEWAGE/SLUDGE ON HELMINTH PARASITE OVA. APPROACH: THE GENERAL APPROACH IS TO DISPENSE ANAEROBICALLY DIGESTED SLUDGE, CONTAINING OVA OF SEVERAL NEMATODES, BUT PARTICULARLY ASCARIS SP., ON STRIP-MINED SOIL WHICH HAS NOT BEEN CONTAMINATED BY LIVESTOCK. AFTER VARIABLE QUANTITIES OF SLUDGE HAVE BEEN PLACED ON PLOTS, WORM-FREE PIGS WILL BE PLACED ON THE EXPERIMENTAL PLOTS WHERE THEY WILL FEED AND LIVE IN A NATURAL ENVIRONMENT WHERE SLUDGE CONTAMINATED WITH OVA HAS BEEN DISPENSED. ANIMALS WILL BE NECROPSIED AT APPROPRIATE TIMES AFTER EXPOSURE TO SLUDGE. APPROPRIATE TISSUES WILL BE SELECTED FOR CHEMICAL ANALYSIS FOR THE HEAVY METALS ZN, CU, CD, CR, NI, PB AND HG, ALSO FLUORIDES AND PCB'S. CURRENT PLANS: CURRENT STUDIES ARE UNDERWAY WHICH INVOLVE POSSIBLE ENHANCEMENT OF PARASITIC INFECTIONS IN CATTLE GRAZING IN SLUDGE IRRIGATED PASTURES. UPTAKE OF HEAVY METALS BY CATTLE WITH POSSIBLE SUBSEQUENT EFFECT UPON HEALTH OF THE ANIMALS IS BEING STUDIED. ANIMALS ARE ALSO BEING MONITORED FOR OCCURRENCE OF OTHER PATHOGENIC ORGANISMS WHICH MAY APPEAR AS A RESULT OF INFECTION WHICH COULD RESULT FROM PATHOGENS DISPERSED IN ANAEROBICALLY DIGESTED SEWAGE SLUDGE.

To better appreciate the ultrastructural alterations that occurred in 71 beagle dogs chronically exposed to air pollutants, transmission electron microscopic morphometry will be used. Ultrastructural quantitation has proven invaluable in delineating the pathogenetic mechansims of gasious-induced pulmonary lesions. Specifically alterations in the thickness of components of the blood-air barrier and in the epithelial cells of the lungs have been statistically appriciated.

It is proposed that both large block plastic sections and ultrathin sections be randomly selected, photographed at 200X and 2500X, respectively, on 35mm film. After transfer of the image to positive 35mm film, the images will be projected on a ground glass screen with interchangeable counting grids. The volumetric density of alveoli, alveolar ducts, and respiratory bronchioles, as well as alveoli located in alveolar ducts or respiratory bronchioles will be calculated. The volumetric density of interstitial tissue (collagen and elastic fibers, fibroblasts, and smooth muscle), type I and type II epithelial cells, epithelial cells, endothelial cells, macrophages, and other migratory cells will be calculated. The numerical and surface densities of alveoli and capillaries will be calculated. The arithmetic mean thickness of the blood-air barrier and all of its components (epithelium, interstitium, and endothelium) will be calculated. The arithmetic mean thickness of vessel and bronchiolar walls will be measured. All of these measurements will use Weibel's methods.

All of the results for each exposure group will be compared to every other group by analysis of variance. Linear regression will be used to examine possible correlations between pulmonary function data reported on these dogs and the morphometric measurements. All significant correlations within a group will be compared to all other groups by analysis of covariance.

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EFFECT OF COAL GASIFICATION PRODUCTS ON THE PULMONARY DEFENSE SYSTEM
AGAINST INFECTIOUS DISEASE (BACTERIAL)
   START/ COMPL DATE :    03/77 - 02/80 : FUNDING : EST, - FY   77  / $  150000
    TASK/EPA CODE :H625F-7162   / R805317     (GRANT)  PRIOR  FY76 /          1
   PROJECT OFFICER : J A  GRAHAM
   INVESTIGATORS :   C   ARANYI                        I I T RESEARCH INSTITUTE
   MILE: 08/77 -AWARD GRANT, PROVIDE 1ST TEST SAMPLE
         08/78 -COMPLETE ACUTE EXPOSURES OF 1ST TEST SAMPLE
         08/78 -SUBMIT ANNUAL REPORT
         08/79 -COMPLETE ACUTE EXPOSURES OF SECOND TEST SAMPLE
         10/79 -SUBMIT ANNUAL REPORT
         08/80 -COMPLETE CHRONIC EXPOSURES
         10/80 -SUBMIT FINAL REPORT
    THE IMPACT OF POLLUTANTS FROM ALTERNATE ENERGY SOURCES (PRIMARILY COAL
    GASSIFICATION) ON PULMONARY DEFENSE SYSTEMS AGAINST INFECTIOUS BACTERIAL
    DISEASE WILL BE INVESTIGATED, ANIMALS WILL BE EXPOSED TO RESPIRABLE-SIZED
    AEROSOLS OF THE POLLUTANT IN A MANNER TO ELUCIDATE DOSE RESPONSE RELATI
    ONSHIPS, THE FOLLOWING PARAMETERS WILL BE USED IN THE INVESTIGATION: (1) M
    ORTALITY AND MEAN SURVIVAL TIME FOLLOWING AEROSOLS OF PATHOGENIC BACTERIA;
    (2) PULMONARY BACTERICIDAL RESPONSES; (3) PULMONARY CELL POPULATIONS; AND
    (4) FUNCTIONING OF ALVEOLAR MACROPHAGES, IF ADVERSE EFFECTS ARE FOUND, THE
     INFLUENCE OF PARTICLE SIZE AND DURATION OF EXPOSURE WILL BE
    TESTED USING THE MOST SENSITIVE PARAMETERS, THE TIME REQUIRED FOR
    RECOVERY FROM ADVERSE EFFECTS WILL ALSO BE DETERMINED,
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POLLUTANTS, AERO-ALLERGENS, AND RESPIRATORY DISEASES

START/ COMPL DATE :   08/77 - 08/80 : FUNDING : EST. - FY   77 / $ 99000
TASK/EPA CODE :H601C-7294   / R805318   (GRANT) PRIOR FY   /   1
PROJECT OFFICER : C G HAYES
INVESTIGATORS :   M D LEBOWITZ   UNIV. OF ARIZONA
MILE: 08/77 -AWARD GRANT
08/78 -PROGRESS REPORT
08/79 -PROGRESS REPORT AND CONTINUATION APPLICATION
08/80 -FINAL REPORT

THE PURPOSE OF THE STUDY IS TO DETERMINE THE INFLUENCE OF CERTAIN MACRO AND MICRO-ENVIRONMENTAL FACTORS ON THE DEVELOPMENT OF RESPIRATORY SYMPTOMS AND AIRWAYS OBSTRUCTIVE DISEASES (ADD). THESE FACTORS HAVE BEEN HYPOTHESIZED TO BE RELATED TO AIRWAYS OBSTRUCTIVE DISEASE. THEY INCLUDE AIR POLLUTANTS (INCLUDING DUST AND SUSPENDED PARTICULATE MATTER), AERO-ALLERGENS (POLLEN, MOLD, FUNGI, ALGAE, INSECTS) AND CLIMATE. THE MICRO-ENVIRONMENT IS THE PERSONAL ENVIRONMENT INCLUDING SOME MACRO-ENVIRONMENTAL (AMBIENT AIR) EXPOSURES. THE FOLLOWING STUDY WILL DETERMINE IF THE RESPIRABLE DUSTS AND OTHER AIR POLLUTANTS (MOSTLY PHOTO-OXIDANTS), AERO-ALLERGENS, COUNTERACT INTERDEPENDENTLY OR INDEPENDENTLY IN PRODUCING RESPIRATORY SYMPTOMS AND/OR AOT. TWO HUNDRED FAMILIES WILL BE STUDIED; WE WILL HAVE A BASELINE AND SUBSEQUENT EVALUATIONS INCLUDING THOROUGH IMMUNOLOGICAL, PHYSIOLOGICAL, AND EPIDEMIOLOGICAL STUDIES. THEY WILL BE MONITORED WITH MICRO-ENVIRONMENTAL MONITORS, AS WELL AS HAVING INFORMATION AS TO THEIR MACRO-EXPOSURE. THEY WILL BE MONITORED FOR SYMPTOMS, LUNG FUNCTION CHANGES, OR IMMUNOLOGIC CHANGES, IN ASSOCIATION WITH THE AIR EXPOSURES. OTHER ANTECEDENT CONDITIONS, SUCH AS GENETIC AND FAMILIAL FACTORS, OCCUPATIONAL EXPOSURES, SMOKING, ETC., WILL BE CONSIDERED. THEIR SYMPTOMS WILL BE MONITORED ON A DAILY BASIS USING A DIARY AND TELEPHONE INTERVIEW. THEY WILL HAVE REGULAR WORKUPS AS WELL AS HAVE EVALUATIONS DURING ANY EXACERBATION OF PRESENT DISEASE, DURING ACUTE RESPIRATORY ILLNESSES AND DURING ASTHMATIC OR ALLERGIC ATTACKS. MULTI-VARIATE STATISTICAL ANALYSES WILL BE UTILIZED TO DETERMINE THE INTERACTIONS OF MACRO- AND MICRO-ENVIRONMENTAL FACTORS, AS WELL AS TO DETERMINE THE RELATIONSHIP BETWEEN THE ENVIRONMENTAL FACTORS AND SYMPTOMS, LUNG FUNCTION, THIS FUNCTION, AND/OR DISEASE, IN THIS POPULATION.

1. Take information gained from alfalfa insect research and apply it at the farm operational level.
   There has been some 15 years of data relating to pest management of alfalfa insects accumulated in Utah. These data include the effects of biological control agents, cultural practices, and pesticides.
2. Demonstrate to the alfalfa growers the wisdom of basing control decisions on conditio in individual fields.
   This will include reports to the growers based on pest population samples. It will also include cost benefit analyses comparing fields following pest managment practice compared to those not following such a program.
3. A side benefit, but not a true objective, is to train a nucleus of pest management scouts.

Some major approaches will be:
a. Routine monitoring of pest populations.
b. Reporting pest conditions to growers.
c. Analyzing alfalfa yields and quality.
d. Analyzing costs and returns to growers.
e. Correlating insect development with weather data.
f. Using the alfalfa and alfalfa weevil models, developed through other projects.
g. Developing an economic model to augment the two models mentioned in "f".

EFFECTS OF CHRONIC SULFUR DIOXIDE FUMIGATION ON PRIMARY PRODUCERS AND INVERTEBRATE CONSUMERS IN A MIXED PRAIRIE ECOSYSTEM

START/ COMPL DATE : 06/77 - 06/80 : FUNDING : EST. - FY 77 / $ 163070
TASK/EPA CODE :M625A-019 / R805320-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : E PRESTON
INVESTIGATORS : J L DODD COLORADO STATE UNIVERSITY
W K LAUENROTH COLORADO STATE UNIVERSITY
MILE: 06/80 -FINAL REPORT

THE OBJECTIVE OF THIS PROJECT IS TO ASSESS THE EFFECTS OF CHRONIC SULFUR DIOXIDE FUMIGATION ON PRIMARY PRODUCERS AND INVERTEBRATE CONSUMERS IN A MIXED PRAIRIE ECOSYSTEM. FIELD EXPERIMENTS ARE DESIGNED TO: (1) CHARACTERIZE PHYSIOLOGICAL RESPONSES OF WESTERN WHEATGRASS TO FOUR SO2 EXPOSURE LEVELS, (2) RELATE PHYSIOLOGICAL RESPONSES TO WHOLE PLANT GROWTH AND POPULATION DYNAMICS OF WESTERN WHEATGRASS ON EACH TREATMENT AREA; (3) INVESTIGATE THE RELATIONSHIPS BETWEEN PHYSIOLOGICAL STATUS OF WESTERN WHEATGRASS AND INFRARED REFLECTIONS. LABORATORY EXPERIMENTS SUPPORT AND AMPLIFY THE FIELD EXPERIMENTS. THESE EXPERIMENTS ARE DESIGNED TO: (1) CHARACTERIZE THE PHYSIOLOGICAL RESPONSE OF WESTERN WHEATGRASS TO SO2 FUMIGATION WITHIN A MINOR RANGE OF ENVIRONMENTAL CONDITIONS, AND (2) DETERMINE THE RELATIONSHIP BETWEEN INTERNAL SULFUR STATUS OF WESTERN WHEATGRASS AND PHYSIOLOGICAL RESPONSES. VARIABLES TO BE MEASURED INCLUDE GROSS PHOTOSYNTHESIS, NET PHOTOSYNTHESIS, PHOTOSPIRATION, DARK RESPIRATION, PLANT AND LEAF WATER POTENTIAL, STAMATA DIFFUSION RESISTANCE AND LEAF TEMPERATURES.

805321 II-430

Objective - To prepare plant tissue material containing toxic elements via in vivo incorporation. The material will be grown in hydroponics solution containing the toxic elements, harvested, dried, ground, blended, homogenized, and analyzed for use as both reference materials and in upcoming cross-check programs. Attempts will be made to collect and process water hyacinth leaves from sewage ponds containing elevated levels of pollutants and from uncontaminated ponds.

Approach - Water hyacinths will be grown in large ponds or tanks. Combinations of various toxic element compounds will be added to the hydroponics solution, as required, to maintain certain minimum concentrations of the toxic elements in the hydroponics solutions. Aerial water hyacinth leaves are harvested periodically and dried. After removal of the stalks, the leaves are ground and the last water trace removed by freeze-drying. After blending and sieving, if required, the dry powder is analyzed for the toxic elements and shipped to EMSL-LV or a location determined by EMSL-LV. A batch of uncontaminated material of similar size will be prepared similarly, except for the incorporation of the toxic elements. Personnel (2-3 people) from the analytical branch of the contractor institution will come to EMSL-LV to conduct analyses of the produced materials jointly with EMSL personnel. An effort will be made to collect aerial leaves of water hyacinths growing in contaminated ponds of two different sewage plants. The leaves will be processed as described above and shipped to EMSL-LV. Similarly, aerial leaves of water hyacinths will be collected from uncontaminated ponds and processed as described above to a dry powder which will be shipped to EMSL-LV.

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STUDY OPERATING CHARACTERISTICS OF HOT-SIDE PRECIPITATORS

   START/ COMPL DATE :     10/77 - 10/79 : FUNDING : EST, - FY   77  / $  148666
    TASK/EPA CODE :F624A-066     / R805324-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : L E  SPARKS
   INVESTIGATORS :   G A RINARD                        UNIV, OF DENVER
                     D E RUGG                          UNIV, OF DENVER
                     W A ALFORD                        UNIV, OF DENVER
                     T D NEVENS                        UNIV, OF DENVER
                     W J CULBERTSON                    UNIV, OF DENVER
                     R E PRESSEY                       UNIV, OF DENVER
   MILE: 09/77 -AWARD GRANT
         09/79 -ISSUE FINAL REPORT WITH SUGGESTED DESIGN CHANGES
     HOT SIDE PRECIPITATORS, THOSE INSTALLED BEFORE THE COMBUSTION PREHEATER IN
      COAL FIRED GENERATING PLANTS, ARE ONE MEANS OF IMPROVING THE EFFI
     CIENCY OF COLLECTION OF HIGH RESISTIVITY FLY ASH, THE OBJECTIVE OF THE RES
     EARCH PROJECT IS TO STUDY THESE HOT SIDE UNITS AND DETERMINE THE CAUSE FOR
     AN APPARENT DECREASED EFFICIENCY AT HIGH ALTITUDE, A SECOND OBJECTIVE IS
      TO GAIN A BETTER UNDERSTANDING OF HOT SIDE UNITS IN GENERAL,
      A SURVEY OF OPERATING HOT SIDE PRECIPITATORS WILL BE CONDUCTED TO D
     ETERMINE IF ALTITUDE IS CLEARLY A FACTOR IN REDUCED EFFICIENCY, THE SURVEY
     WILL ALSO PROVIDE DATA THAT WILL BE CORRELATED TO DETERMINE OTHER CAUSES
     FOR REDUCED EFFICIENCY, THE EXPERIMENTAL WORK TO BE CONDUCTED WILL
     DEPEND ON THE OUTCOME OF THE SURVEY,
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II-432

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INPUTS OF HAZARDOUS ORGANICS FROM THE ATMOSPHERE TO SAGINAW BAY

   START/ COMPL DATE :    07/77 - 06/79 : FUNDING : EST. - FY   77  / $   41187
    TASK/EPA CODE :N608A-030     / R805325-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : M D  MULLIN
   INVESTIGATORS :    T J MURPHY
   MILE: 09/79 -FINAL REPORT DUE                            DEPAUL UNIVERSITY
     THE OBJECTIVES OF THIS PROJECT ARE TO DETERMINE THE ATMOSPHERIC INPUTS OF
    POLYCHOLORINATED BIPHENYLS (PCBS) ARE POLYCYCLIC AROMATIC HYDROCARBONS (P
    AHS) TO SAGINAW BAY, IN LAKE HURON. PRECIPITATION AND DRY DEPOSITION SAMPL
    ES WILL BE COLLECTED AT SEVERAL LOCATIONS AROUND THE BAY. THESE SAMPLES WI
    LL BE ANALYZED FOR AROCLOR 1242, 1254 AND 1260, FOR THE MAJOR PAHS PRESENT
    AND FOR THE PAHS KNOWN TO BE CARCINOGENS.
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II-433

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VERTICAL DISTRIBUTION OF HYDROCARBONS IN AN URBAN ATMOSPHERE DURING
CONDITIONS OF LOW LEVEL TEMPERATURE INVERSIONS
   START/ COMPL DATE :    06/77 - 12/78 : FUNDING : EST. - FY   77  / $    8200
    TASK/EPA CODE :G603A-AC-21  / R805327-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : -    BUFALINI
   INVESTIGATORS :       COFFEY                      STATE UNIVERSITY OF NEW YORK
   MILE: 12/78 -FINAL REPORT
     MEASUREMENT OF DETAILED HC'S IN THE NEW YORK AREA WILL BE MADE.
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The chemical reactions which form and degrade iron-cyanides are being investigated under controlled conditions,to determine reaction rates and mechanisms. This will provide basic data for evolution of cyanide control strategies, either by inhibition of complex-forming reactions or by destruction of the complexes, once formed. Experiments will be carried out with actual coking and blast furnace wastewaters to verify reaction mechanisms and evaluate control strategies. Chemical analyses for free and complex cyanides will be modified to eliminate interferences in the wastewater studies.

The stability of solid iron-cyanide complexes (i.e.,slow degradation) in a landfill environment will be investigated. New treatment processes will result in large quantities of solid ferrocyanides requiring final disposal. The stability of these materials under a reducing and acidic environment needs to be demonstrated.

II-435

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EVALUATION OF THE DIONEX ION-EXCHANGE CHROMATOGRAPH FOR NATURAL WATER
SAMPLE ANALYSIS
   START/ COMPL DATE :    08/77 - 11/78 : FUNDING : EST. - FY   77  / $   36056
    TASK/EPA CODE :A622B-04      / R805329-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : M    GALES
   INVESTIGATORS :   A   SCHLUETER                    CENTRAL STATE UNIVERSITY
   MILE: 11/77 -DETERMINE RETENTION TIMES AND SEPARATION PROFILE OF ANIONS
         08/77 -ANALYSIS OF ALKALI AND ALKALI-EARTH METALS IN WATER SAMPLES
         02/78 -FINAL REPORT
    THIS WORK HAS THE OBJECTIVE OF EVALUATING THE DIONEX ION EXCHANGE CHRO
    MATOGRAPH FOR NATURAL WATER SAMPLE ANALYSIS. INITIAL WORK WILL UTILIZE SYN
    THETIC LABORATORY SAMPLES APPROXIMATING NATURAL WATER IONIC CONCENTRATION.
    THE RESPONSE OF THE DIONEX INSTRUMENT TO THESE SOLUTIONS, THE CONSISTENCY
    OF ION RETENTION TIMES, THE PROPER SUPPORTING ELECTROLYTE AND THE EXTENT
     OF PEAK OVERLAP WILL BE INVESTIGATED. WITH OPTIMUM EXPERIMENTAL
    CONDITIONS FOR ION SEPARATION THE APPLICABILITY OF THE INSTRUMENT TO ID
    ENTIFY AND TO QUANTITATIVELY MEASURE NATURAL WATER ION CONCENTRATIONS WILL
    BE DETERMINED.
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II-436

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EVALUATION OF THE DIONEX ION EXCHANGE CHROMATOGRAPH FOR NATURAL WATER
SAMPLES ANALYSIS
   START/ COMP. DATE :    08/77 - 01/79 : FUNDING : EST. - FY   77  / $   28058
    TASK/EPA CODE :A625C-22      / R805329-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : M E  GALES
   INVESTIGATORS :   A   SCHLUETER                   CENTRAL STATE UNIVERSITY
     THE ION-EXCHANGE CHROMATOGRAPH MANUFACTURED BY DIONEX CORP. HAS THE P
     OTENTIAL OF SEPARATING AND QUANTITATIVELY DETERMINING THE CONCENTRATIONS O
     F ANIONS AND CATIONS PRESENT IN NATURAL WATERS. THIS PROJECT WILL EVALUATE
      THE DIONEX ION-EXCHANGE CHROMATOGRAPH TO DETERMINE ITS ABILITY AND
      LIMITATIONS IN ANALYZING NATURAL WATER SAMPLES FOR ANIONS AND CATIONS
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II-437

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STAGED COMBUSTION FOR NOX CONTROL AND ENHANCED SO3 EMISSIONS

    START/ COMPL DATE :    07/77 - 01/78 : FUNDING : EST. - FY   77  / $   34559
     TASK/EPA CODE :F624A-020     / R805330-01  (GRANT)  PRIOR  FY    /           1
    INVESTIGATORS :    A    LEVY                      BATTELLE MEMORIAL INSTITUTE
    MILE: 07/77 -INITIATE GRANT
          01/78 -COMPLETE ASSESSMENT OF ENHANCED SULFATE FORMATION FROM STAGE CO
          02/78 -COMPLETE FINAL REPORT
     PREVIOUS EXPERIMENTAL STUDIES INDICATE THAT STAGED COMBUSTION PROCESSES
     DESIGNED TO REDUCE NOX EMISSIONS MAY ENHANCE SO3 EMISSION. THE O
     BJECTIVE OF THIS PROPOSED PROGRAM IS TO INVESTIGATE THE EXTENT TO WHICH SO
     3/SO2 RATIOS MAY BE INCREASED WHEN NOX EMISSIONS IS REDUCED UNDER SPECIFIC
     AND WELL DEFINED CONDITIONS OF STAGED COMBUSTION. FOR THESE STUDIES, A
     SIMPLE TWO-STAGE LABORATORY BURNER WILL BE USED. MEASUREMENTS OF NOX,
     SO2, SO3, AND TEMPERATURE WILL BE AT THE EXIT OF EACH STAGE FOR BOTH SI
     NGLE-STAGE AND TWO-STAGE OPERATION OF THE BURNER UNDER DIFFERENT OPERATING
      CONDITIONS. RESULTS FROM THESE STUDIES WILL BE USED TO ASSESS THE
      EXTENT TO WHICH ENHANCED SO3 PRODUCTION CAN BE A PROBLEM IN STAGED
     COMBUSTION SYSTEMS.
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II-438

INVESTIGATE INTERFERENCES IN OPTICAL INFRARED MEASUREMENT TECHNIQUES

START/ COMPL DATE : 07/77 - 07/80 : FUNDING : EST. - FY 77 / $ 40000
TASK/EPA CODE :G712B-BE-45 / R805332-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : W A MCCLENNY
INVESTIGATORS : R R PATTY UNIV. OF NORTH CAROLINA
MILE: 11/79 -IN-SITU MEASUREMENTS OF SULFATES COMPLETE

OBJECTIVES: TO SPONSOR THE DEVELOPMENT OF A RESEARCH EFFORT DIRECTED AT THE IDENTIFICATION AND QUANTIFICATION OF GASEOUS AND PARTICULATE ABSORBERS IN THE INFRARED, PARTICULARLY IN THE SPECTRAL REGION NEAR 9 MICRONS.APPROACH: TO FUND A GRANT EFFORT IN WHICH THE OPTICAL TECHNIQUE OF OPTO-ACOUSTIC DETECTION IS USED TO MEASURE ABSORPTION COEFFICIENTS OF GASEOUS AND PARTICULATE ABSORBERS IN THE INFRARED AND TO QUANTIFY AMBIENT CONCENTRATIONS OF THESE ABSORBERS. THE APPROACH IS SUFFICIENTLY NEW SO THAT SEVERAL FEASIBILITY EXPERIMENTS WILL BE TRIED INITIALLY IN ORDER TO DETERMINE THE MOST EFFECTIVE RESEARCH PLAN. CURRENT PLANS /PROGRESS: CURRENT PLANS INCLUDE: (1) INITIATE EXPERIMENTS TO DETERMINE FEASIBILITY (TO BEGIN IN THE SUMMER OF 1977); (2) FINALIZATION OF FIRST YEAR RESEARCH OBJECTIVES AS BASED ON INITIAL FEASIBILTY STUDIES (IN THE FALL OF 1977). PROGRESS DURING THE IMMEDIATE PAST HAS CONSISTED OF THE PROCESSING OF A GRANT PROPOSAL.

ASSESSMENT OF NEARSHORE BENTHIC MICROINVERTEBRATES IN LAKE MICHIGAN

START/ COMPL DATE : 06/77 - 05/78 : FUNDING : EST. - FY 77 / $ 75345
TASK/EPA CODE :N608A-026 / R805333-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : W R SWAIN
INVESTIGATORS : S C MOZLEY UNIV. OF MICHIGAN
M W WINNELL UNIV. OF MICHIGAN
MILE: 06/77 -START GRANT
05/78 -TERMINATE GRANT
08/78 -FINAL REPORT

THE OBJECTIVE OF THIS PROJECT IS TO CONSTRUCT A THOROUGH DESCRIPTION OF THE COMPOSITION, DISTRIBUTION AND CORRESPONDENCE TO PROMINENT ENVIRONMENTAL FEATURES (E.G., SEDIMENT TEXTURE, CONCENTRATIONS OF TOXIC CHEMICALS) OF BENTHIC ANIMALS IN LAKE MICHIGAN. A SET OF 302 SAMPLES ARRAYED OVER THE ENTIRE LAKE WAS COLLECTED BY THE CANADA CENTRE FOR INLAND WATERS IN 1975. THESE SAMPLES WILL BE PROCESSED UNDER THE PRESENT CONTRACT AND SUPPLEMENTED BY AN ADDITIONAL 252 SAMPLES CONCENTRATED IN THE NEARSHORE AREAS (LESS THAN 60 M DEEP) OF THE MAIN BASIN IN JULY 1977. DATA FROM BOTH SETS OF SAMPLES WILL BE ANALYZED PARTICULARLY FOR INFORMATION ABOUT INDICATOR SPECIES, SO THAT A BENCHMARK FOR FUTURE COMPARISONS AND ASSESSMENTS OF RELATIVE IMPROVEMENT OR DETERIORATION OF THE BENTHIC ENVIRONMENT WILL BE AVAILABLE. DESCRIPTIONS OF OTHER BASIC CHARACTERISTICS OF THE BENTHOS, SUCH AS ARRANGEMENTS OF SPECIES INTO ASSEMBLAGES, AND GEOGRAPHICAL GRADIENTS IN ASSEMBLAGES WHICH ARE RELATED TO CLIMATE OR CIRCULATION PATTERNS IN THE LAKE WILL ALSO BE UNDERTAKEN.

DEVELOPMENT OF A MODEL OF SO2 OXIDATION IN SMOG

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   START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST. - FY   77  / $   50000
    TASK/EPA CODE :G625B-EA-04  / R805335-01  (GRANT)  PRIOR  FY76 / $   730001
   PROJECT OFFICER : J J  BUFALINI
   INVESTIGATORS :   D F MILLER                          BATTELLE MEMORIAL INSTITUTE
                     G M SVERDRUP                        BATTELLE MEMORIAL INSTITUTE
   MILE: 06/78 -FINAL REPORT
     THE IMMEDIATE OBJECTIVE OF THIS STUDY IS TO PROVIDE A NEW AND MORE C
     OMPREHENSIVE BODY OF DATA USEFUL IN EVALUATING CURRENT THEORIES FOR THE GA
     S-PHASE OXIDATION OF SO2 IN POLLUTED AIR. THE ULTIMATE GOAL OF THE PROGRAM
     IS TO DEVELOP AND VALIDATE A MODEL WHICH WILL BE USEFUL IN PREDICTING SO2
      OXIDATION RATES FOR A VARIETY OF ATMOSPHERIC CONDITIONS, INCLUDING T
     HOSE FOR PLUMES FROM COMBUSTION SOURCES, URBAN CORE SMOG AND URBAN PLUMES,
     AND LONG-RANGE TRANSPORT OF LARGE AIR MASSES. EXPERIMENTS OF
     SO2 OXIDATION WILL BE CONDUCTED WITH THREE SMOG SYSTEMS: PROPYLENE, A S
     URROGATE MIXTURE OF URBAN HYDROCARBONS, AND EARLY-MORNING AIR IN COLUMBUS,
      OHIO. COMPARATIVE DATA FROM THESE THREE SYSTEMS WILL BE USED TO ASSESS
     THE ADEQUACY OF EXISTING KINETIC MODELS FOR SO2 OXIDATION AND TO FORMULATE
     MORE UNIQUE MODELS WHERE NECESSARY.
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II-441

COAL AND THE ENVIRONMENT - ABSTRACT BIBLIOGRAPHIES

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START/ COMPL DATE :    05/77 - 10/78 : FUNDING : EST. - FY   77  / $   33000
 TASK/EPA CODE :1B623B-320    / R805336-01  (GRANT)  PRIOR  FY76 /          1
PROJECT OFFICER : R D  HILL
INVESTIGATORS :    J F BOYER                     BITUMINOUS COAL RESEARCH INC.
                   V E GLEASON                   BITUMINOUS COAL RESEARCH INC.
MILE: 05/77 -FUNDING PACKAGE SUBMITTED
      06/77 -AWARD FUNDS FOR PROJECT
      10/78 -FINAL REPORT RECEIVED
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THE OBJECTIVE IS TO PROVIDE EASY ACCESSIBILITY TO THE SPECIFIC LITERATURE ON THE ENVIRONMENTAL PROBLEMS RELATED TO COAL PRODUCTION. THE PROBLEMS COVERED ARE COAL MINE DRAINAGE, DISPOSAL OF THE REFUSE MATERIAL GENERATED BY COAL MINES AND COAL CLEANING PLANTS, AND SURFACE MINE RECLAMATION. THIS OBJECTIVE WILL BE ATTAINED BY COLLECTING ALL RELEVANT INFORMATION AND PREPARING, ON AN ANNUAL ROTATING BASIS, ABSTRACT BIBLIOGRAPHIES OF THE LITERATURE FOR EACH SUBJECT AREA. THE REFUSE BIBLIOGRAPHY WILL BE AVAILABLE EARLY IN 1978 AND THE RECLAMATION BIBLIOGRAPHY EARLY IN 1979. EACH BIBLIOGRAPHY WILL CONTAIN A LISTING OF REFERENCES TO THE MINE DRAINAGE BIBLIOGRAPHY PUBLISHED IN 1976. THIS PROJECT IS A CONTINUATION OF WORK BEGUN AT BCR IN 1961. CURRENTLY THE HOLDINGS IN THE BCR LIBRARY ON COAL MINE DRAINAGE ARE THE LARGEST IN THE WORLD. FROM 1964 TO 1975 BCR PREPARED, FOR PUBLICATION BY THE COMMONWEALTH OF PENNSYLVANIA, AN ANNUAL BIBLIOGRAPHY OF ABSTRACTS ON MINE DRAINAGE. IN 1976 EPA AND THE COMMONWEALTH SPONSORED THE PREPARATION BY BCR OF A COMPREHENSIVE MINE DRAINAGE BIBLIOGRAPHY. IN 1975 BCR AND THE NATIONAL COAL ASSOCIATION PUBLISHED A BIBLIOGRAPHY ON COAL MINED-LAND RECLAMATION. COLLECTING OF MATERIAL ON REFUSE DISPOSAL BEGAN IN 1974; NO ABSTRACT BIBLIOGRAPHY HAS BEEN PREPARED.

II-442

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DEVELOPMENT OF A TISSUE SELECTIVE IN VIVO BIOASSAY FOR ENVIRONMENTAL
AGENTS PRODUCING DNA DAMAGE
   START/ COMPL DATE :    10/77 - 12/81 : FUNDING : EST. - FY   77  / $  200000
    TASK/EPA CODE :D614B-044    / R805337-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R J  GARNER
   INVESTIGATORS :    R W HART                        OHIO STATE UNIVERSITY
                      D T WITIAK                      OHIO STATE UNIVERSITY
                      A   KOESTNER                    OHIO STATE UNIVERSITY
                      N J LEWIS                       OHIO STATE UNIVERSITY
                      R   FERTER                      OHIO STATE UNIVERSITY
   MILE: 03/79 -MOLECULAR QUANTITATION OF EFFECTS OF ETHYL-N-NITROSOUREA
         09/79 -PATHOLOGY OF ENU STUDIES
         03/80 -MOLECULAR QUANTITATION OF EFFECTS OF 7,12 DIMETHYLBENZO(GAMMA)A
         09/80 -PATHOLOGY OF DMBA STUDIES
         03/81 -MOLECULAR QUANTITATION OF EFFECTS OF BENZO(GAMMA)PYRENE AND ANA
         09/81 -PATHOLOGY OF BP
         12/81 -COMPLETION OF STUDY:  FINAL REPORT
    THE LONG-TERM GOAL OF THIS PROGRAM IS THE DEVELOPMENT AND QUANTITATION OF
    A RAPID, INEXPENSIVE, TISSUE SPECIFIC IN VIVO BOASSAY SYSTEM FOR
    ENVIRONMENTAL CARCINOGENS/MUTAGENS. IT IS ANTICIPATED THAT ULTIMATELY THIS
    ASSAY WILL PERMIT THE QUANTITATIVE AND QUALITATIVE PREDICTION OF THE
     CARCINOGENIC POTENTIAL OF VARIOUS AGENTS ALONE OR IN COMBINATION ON
    ANY TISSUE OR ORGAN IN VIVO. SINCE MOST CARCINOGENS DAMAGE CELLULAR DNA,
     THE ASSAY WILL BE BASED ON AN ANALYSIS OF THIS DAMAGE IN VIVO BY
    EMPLOYMENT OF ENDONUCLEASE SENSITIVE SITE ASSAYS IN COMBINATION WITH DNA
    MOLECULAR WEIGHT ANALYSIS (SUCROSE GRADIENT SEDIMENTATION AND GEL ELECTR
    OPHORESIS). QUANTITATION OF DNA WILL BE ACCOMPLISHED BY A NEWLY DEVELOPED,
    SENSITIVE SPECTROFLUOROMATIC ASSAY. WE WILL QUANTITATE THIS ASSAY BY (1)
    USE OF 14C-LABELED CARCINOGENS OF HIGH SPECIFIC ACTIVITY (DMBA, BP, AND
    ENU) TO MEASURE THE EXTENT OF BINDING TO, AND REMOVAL FROM, DNA, AND
    (2) BY COMPARING THE EXTENT OF DNA DAMAGE IN VARIOUS ANIMAL MODEL
    SYSTEMS WITH DIFFERENTIAL TISSUE AND SPECIES SENSITIVITIES TO THE EFFECTS
    OF THESE CARCINOGENS. FROM SUCH DATA, WE WILL PRODUCE A PREDICTIVE MODEL
    SYSTEM FOR THE RATIONAL EXTRAPOLATION OF THIS INFORMATION TO
    CARCINOGENIC POTENTIALS IN MAN.
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KINETICS OF EVOLUTION OF SULFUR-BEARING GASES FROM BLAST FURNACE SLAGS

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START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST. - FY   77  / $   12100
 TASK/EPA CODE :F6108-01     / R805338-01  (GRANT)  PRIOR  FY   /         1
PROJECT OFFICER : N    PLAKS
INVESTIGATORS :   J F ELLIOTT                      MASS. INST. OF TECHNOLOGY
MILE: 07/77 -START GRANT
      07/78 -COMPLETE GRANT
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OBJECTIVE: INVESTIGATE THE FUNDAMENTAL PHYSICO-CHEMICAL FACTORS AFFECTING THE FORMATION OF SO2 AND/OR H2S FROM A REACTION WITH HOT BLAST FURNACE SLAG AND DESULFURIZATION RESIDUES. APPROACH: INVESTIGATE THE FUNDAMENTAL FACTORS AFFECTING THE FORMATION OF SO2 AND H2S FROM REACTION WITH HOT BLAST FURNACE SLAGS AND DESULFURIZATION RESIDUES. IF THESE REACTIONS ARE BETTER UNDERSTOOD, ONE CAN DEVELOP MEANS TO CONTROL THE EVOLUTION OF SULFUR BEARING GASES INTO THE ATMOSPHERE FROM THIS SOURCE. INCLUDED IS THE STUDY OF THE EFFECTS OF THE COMPOSITION OF THE SLAG ON THE KINETIC PROCESSES. IF THE STUDY IS SUCCESSFUL, THE PRACTICALITY OF PROCESS CONTROL AS A MEANS OF ELIMINATING SULFUR EMISSIONS FROM HOT SLAG CAN BE ASCERTAINED. OUTPUT: THE OUTPUT OF THIS GRANT WILL BE A FINAL REPORT.

DEVELOPMENT OF AN IN VITRO NEUROTOXICITY ASSAY

START/ COMPL DATE : 09/77 - 09/80 : FUNDING : EST. - FY 77 / $ 56900
TASK/EPA CODE :H615F-7612 / R805339 (GRANT) PRIOR FY / 1
PROJECT OFFICER : R L BARON
INVESTIGATORS : R J RICHARDSON UNIV. OF MICHIGAN
MILE: 09/77 -AWARD GRANT

A MEMBRANE BOUND PROTEIN, NEUROTOXIC ESTERASE (NTE), FROM NERVOUS TISSUE OF THE HEN HAS BEEN SHOWN TO BE A MOLECULAR TARGET FOR NEUROTOXIC ORGANOPHOSPHORUS COMPOUNDS. NTE CAN BE ASSAYED BY A DIFFERENTIAL INHIBITION PROCEDURE WHICH REMOVES ACITVITY DUE TO IRRELEVANT ESTERASES. THE ASSAY CAN BE USED TO PREDICT THE NEUROTOXIC POTENTIAL OF ORGANOPHOSPHORUS COMPOUNDS. TO ENABLE NEUROTOXICITY ASSESSMENT TO BE CARRIED OUT RAPIDLY ON LARGER NUMBERS OF COMPOUNDS, A COMPLETELY IN VITRO ASSAY SYSTEM WILL BE DEVELOPED. NTE WILL BE PURIFIED FROM THE RICHEST IDENTIFIABLE TISSUE SOURCE AND IMMOBILIZED IN A SOLID MATRIX OR LIQUID MEMBRANE SYSTEM FOR USE IN A CONTINUOUS-FLOW ENZYME REACTOR. SUITABILITY OF THE IMMOBILIZED ENZYME WILL BE DETERMINED BASED ON KINETIC RESPONSE TO DIFFERENT SUBSTRATES AND INHIBITORS COMPARED TO NATIVE ENZYME.

II-445

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EPIDEMIOLOGICAL-MICROBIOLOGICAL STUDY ON HEALTH EFFECTS AMONG SWIMMERS
AT LAKE PONTCHARTRAIN IN NEW ORLEANS
  START/ COMPL DATE :    00/77 - 00/78 : FUNDING : EST. - FY   77  / $   60000
   TASK/EPA CODE :D607A-040    / R805341-01  (GRANT)  PRIOR  FY    /         1
  PROJECT OFFICER : V J  CABELLI
  INVESTIGATORS :   V K  KTSANES                     TULANE UNIVERSITY OF LOUISIAN
                    A C  ANDERSON                    TULANE UNIVERSITY OF LOUISIAN
                    J E  DIEM                        TULANE UNIVERSITY OF LOUISIAN
  MILE: 10/77 -COMPLETE TRIALS
        09/78 -COMPLETE ANALYSIS OF DATA AND PREPARE REPORT
   THE PURPOSE OF THIS STUDY IS TO MEASURE THE HEALTH EFFECTS OF SWIMMING IN
   SUBTROPICAL RECREATIONAL WATERS. IT REPRESENTS ONE APPROACH TO THE
   DEVELOPMENT OF WATER QUALITY CRITERIA FOR THE RECREATIONAL WATERS
   AROUND ALL OF THE NATION'S CITIES. SPECIFICALLY, THE OBJECTIVES ARE TO MEA
   SURE THE HEALTH EFFECTS OF SWIMMING UNDER VARIOUS CONDITIONS AND LEVELS OF
    WATER POLLUTION. A VARIETY OF GASTROINTESTINAL AND RESPIRATORY SYMPTOMS
   ARE USED AS HEALTH INDICATORS. DAY-TO-DAY VARIATION IN MICROBIAL COUNTS
   IN LAKE PONTCHARTRAIN PROVIDES THE ENVIRONMENTAL LABORATORY FOR STUDY.
   DIFFERENCES BETWEEN BEACH-GOERS WHO SWIM AND THOSE WHO DO NOT WILL ALSO BE
   TESTED. DURING THE SUMMER OF 1977 WEEKEND BEACH-GOERS WHO DO NOT SWIM
   MIDWEEK WILL BE INTERVIEWED AT THE BEACH CONCERNING THEIR EXPOSURE TO T
   HE WATER. ON THESE DAYS WATER SAMPLES WILL BE TAKEN AND ANALYZED FOR FECAL
    COLIFORMS, ENTEROCOCCI, KLEBSIELLA, PSEUDOMONAS, AND E. COLI. TELEPHONE
   CONTACT WITH RESPONDENTS 8-10 DAYS LATER WILL BE MADE FOR REPORTS ON
   ILLNESS FOLLOWING THE DAY AT THE BEACH. THE ASSOCIATION BETWEEN SWIMMING
   AND THE DEVELOPMENT OF ILLNESS UNDER THE DIFFERENT POLLUTION LEVELS WILL
   BE MEASURED BY THE LOG ODDS RATIO, THE DIFFERENCE IN PROPORTIONS, AND
   THE RELATIVE DIFFERENCE.
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II-446

EXPERIMENTAL DETERMINATION OF DRY DEPOSITION RATES

START/ COMPL DATE : 06/77 - 06/78 : FUNDING : EST. - FY 77 / $ 40000
TASK/EPA CODE :G603A-AF-05 / R805342-01 (GRANT) PRIOR FY76 / $ 400001
PROJECT OFFICER : W LONNEMAN
INVESTIGATORS : E ROBINSON WASHINGTON STATE UNIVERSITY
H WESTBERG WASHINGTON STATE UNIVERSITY
MILE: 06/78 -PROGRESS REPORT
12/79 -REPORT ON LIFE TIMES OF POLLUTANTS

THE GOAL OF THIS RESEARCH EFFORT IS TO MEASURE DRY DEPOSITION RATES FOR POLLUTIONS RELATED TO PHOTOCHEMICAL AIR POLLUTION IN TYPICAL FIELD SITUATIONS, A FIELD MEASUREMENT FACILITY FOR MONITORING THE DEPOSITION VELOCITY OF SUCH POLLUTANTS AS SO2, O3, AND NOX WILL BE ASSEMBLED. A PORTABLE TOWER WITH POLLUTANT SAMPLING AND METEOROLOGICAL SENSORS AT FOUR LEVELS BETWEEN THE TOP OF THE UNDERLYING VEGETATION AND A HEIGHT OF 10 M ABOVE THIS SURFACE VEGETATION WILL BE USED TO OBTAIN PROFILE MEASUREMENTS IN THE BOUNDARY LAYER, THE RESULTS OF THESE EXPERIMENTS SHOULD LEAD TO A BETTER UNDERSTANDING OF THE FACTORS AFFECTING DRY DEPOSITION AND TO IMPROVED MODELING PROCEDURES.

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RURAL OXIDANT STUDIES AND THE ROLE OF NOX IN RURAL OXIDANT FORMATION

   START/ COMPL DATE :    05/77 - 05/78 : FUNDING : EST. - FY   77  / $   70000
    TASK/EPA CODE :G603A-AC-08  / R805343-01  (GRANT)  PRIOR  FY76 / $   830001
   PROJECT OFFICER : W    LONNEMAN
   INVESTIGATORS :   H   WESTBERG                    WASHINGTON STATE UNIVERSITY
                     E   ROBINSON                    WASHINGTON STATE UNIVERSITY
   MILE: 10/78 -FINAL REPORT
     THE PURPOSE OF THIS RESEARCH STUDY IS TO INVESTIGATE THE SOURCE OF HIGH
     OXIDANT LEVELS IN RURAL AREAS. SPECIFIC GOALS INCLUDE MONITORING IND
     IVIDUAL HYDROCARBONS IN THE C2 - C10 MOLECULAR WEIGHT RANGE, NOX AND OZONE
     IN NON-URBAN AREAS OF THE WESTERN AND MIDWESTERN UNITED STATES. THE STUDY
     WILL INVOLVE BOTH GROUND-BASED AND AIRCRAFT MONITORING. WE ALSO PLAN TO
     CONDUCT A NUMBER OF NATURAL SUNLIGHT IRRADIATION EXPERIMENTS DESIGNED
     TO PROVIDE INFORMATION ABOUT HOW FRESH INPUTS OF NOX AFFECT PHOT
     OCHEMICAL BEHAVIOR OF RURAL AIR MASSES. THE FIELD PORTION OF THIS STUDY IS
     SCHEDULED FOR JULY AND AUGUST OF 1977.
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II-448

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PREPARE STATE-OF-THE-ART REPORT ON TOXIC SUBSTANCES IN AQUATIC ORGANISMS

   START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST, - FY   77  / $   20000
    TASK/EPA CODE :4612A-13      / R805344-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : C I  WEBER
   INVESTIGATORS :   M   MCKOWN                       GULF SOUTH RESEARCH INSTITUTE
   MILE: 07/78 -STATE-OF-THE-ART REPORT ON TOXIC SUBSTANCES IN AQUATIC ORGANISM
     OBJECTIVE: TO DETERMINE THE CURRENT STATUS OF METHODOLOGY FOR THE COLLECTI
     ON AND ANALYSIS OF AQUATIC ORGANISMS FOR BIOACCUMULATION OF TOXIC SUBSTANC
     ES, APPROACH: THE PRINCIPAL INVESTIGATOR WILL SEARCH THE LITERATURE TO OBT
     AIN INFORMATION ON METHODS OF SAMPLE COLLECTION, PRESERVATION, PREPARATION
      AND ANALYSIS FOR TOXIC SUBSTANCES, SPECIAL EMPHASIS WILL BE PLACED ON THE
      TOXIC SUBSTANCES LISTED IN THE "CONSENT DECREE," THE METHODS WILL BE
     EVALUATED AND THE DATA ON TOXIC SUBSTANCES WILL BE COMPILED AND
     CODED FOR COMPUTER STORAGE, OUTPUT: STATE-OF-THE-ART REPORT ON TOXIC
     SUBSTANCES IN AQUATIC ORGANISMS.
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II-449

805354

The objectives of this research are to produce methane and volatile fatty acids from alkali treated bagasse and other cellulose wastes. A process has been proposed that will be tested for continuous removal of intermediate organic acids formed in the anaerobic generation of methane.

IV-450

MUCUS GLYCOPROTEINS SECRETED BY TRACHEAL EXPLANTS FROM RATS EXPOSED TO POLLUTANTS

START/ COMPL DATE : 11/77 - 10/80 : FUNDING : EST, - FY 77 / $ 36000
TASK/EPA CODE :H601B-7124 / R805355 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : J A GRAHAM
INVESTIGATORS : J A LAST UNIV, OF CALIFORNIA
MILE: 11/77 -AWARD GRANT
01/78 -BEGIN EXPOSURES
04/79 -COMPLETE INITIAL IN VIVO EXPOSURES TO O_3 AND H_2SO_4
08/80 -COMPLETE EXPOSURES TO COMBINATIONS OF O_3 AND H_2SO_4
10/80 -FINAL REPORT

THE EFFECTS OF EXPOSURE OF RATS OF OZONE AND SULFURIC ACID AEROSOLS, POLLUTANT GASES THAT CAUSE IRRITATION TO THE AIRWAYS, ARE BEING EVALUATED. PRELIMINARY DATA SUGGEST THAT THERE ARE QUALITATIVE AND QUANTITATIVE CHANGES IN GLYCOPROTEINS SECRETED BY CULTURED TRACHEA FROM ANIMALS EXPOSED TO OZONE OR TO MIXTURES OF OZONE AND SULFURIC ACID. INTERESTINGLY, SULFURIC ACID AND OZONE APPEAR TO ACT SYNERGISTICALLY. TO PERFORM AN EXPERIMENT, WE INCUBATE EXCISED TRACHEA IN ORGAN CULTURE IN THE PRESENCE OF ISOTOPICALLY LABELED PRECURSOR SUGARS OR AMINO ACIDS. THE RADIOACTIVE LABEL ALLOWS US TO QUANTITATE SECRETED GLYCOPROTEINS, AND RELATE THOSE QUANTITATIVE DATA TO THE POLLUTANT REGIMEN TO WHICH THE RATS HAD BEEN EXPOSED. IT IS ANTICIPATED THAT THESE STUDIES WILL ADD TO OUR BASIC KNOWLEDGE CONCERNING REACTIONS OF THE RESPIRATORY SYSTEM WITH AIR POLLUTANTS, AND OF TRACHEAL METABOLISM, WITH A FOCUS ON THE MOST IMPORTANT SECRETORY PRODUCTS OF THIS ORGAN, THE MUCUS GLYCOPROTEINS. SUCH KNOWLEDGE IS RELEVANT TO A BETTER UNDERSTANDING OF SEVERAL HUMAN DISEASES, INCLUDING CHRONIC BRONCHITIS, AND TO A RATIONAL EVALUATION OF THE ROLE(S), IF ANY, THAT EXPOSURE TO AIR POLLUTANTS PLAY(S) IN THE DEVELOPMENT OF THESE DISEASES OF THE CONDUCTING AIRWAYS.

IV-451

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MEASUREMENT AND EVALUATION PROCEDURES FOR ENVIRONMENTAL R AND D

   START/ COMPL DATE :    07/77 - 06/78 : FUNDING : EST, - FY   77  / $  136451
    TASK/EPA CODE :F624A-089     / R805356-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : S Z  SHARIQ
   INVESTIGATORS :     A H RUBENSTEIN                  NORTHWESTERN UNIVERSITY
                       P H FARQUHAR                    NORTHWESTERN UNIVERSITY
                       N   BAKER                       UNIV, OF CINCINNATI
                       W E SOUDER                      UNIV, OF PITTSBURGH
                       A P HURTER                      NORTHWESTERN UNIVERSITY
                       E   GEISLER                     NORTHEASTERN ILL, STATE UNIV,
                       A K CHAKRABARTI                 DREXEL UNIVERSITY
   MILE: 06/78 -PHASE I FINAL REPORT: RECOMMENDATIONS ON MEASUREMENT AND EVALUA
     AS PART OF ITS EFFORTS IN PROMOTING BOTH IMPROVED ENVIRONMENTAL A
     SSESSMENTS AND POLLUTION CONTROL TECHNOLOGIES FOR INDUSTRIAL PROCESSES AND
     ENERGY PRODUCTION, IERL-RTP CARRIES OUT FIVE BASIC ACTIVITIES: (1) THE
     ASSESSMENT OF AREAS WHERE CONTROL TECHNOLOGIES ARE LIKELY TO HAVE SIGNIF
     ICANT ENVIRONMENTAL IMPACT, (2) THE TRANSLATION OF SUCH ASSESSMENTS INTO S
     PECIFIC R AND D WORK UNITS AND THE ALLOCATION OF FUNDS NEEDED TO CARRY OUT
      THIS WORK, (3) THE IDENTIFICATION OF PROJECTS AND FUNDING OF CO
     NTRACTORS TO ACCOMPLISH THE WORK UNITS PLANNED, (4) THE MONITORING AND EVA
     LUATION OF THE PROGRESS AND PERFORMANCE ON VARIOUS R AND PROJECTS, AND (5)
     THE DISSEMINATION OF RESULTS FROM R AND D PROJECTS TO POTENTIAL USERS, THE
     PRIMARY GOAL OF THE PROPOSED RESEARCH IS TO SUPPORT THESE BASIC
     ACTIVITIES AT IERL-RTP BY PROVIDING EFFECTIVE METHODS TO: (1) IDENTIFY THE
     TECHNOLOGICAL, ENVIRONMENTAL, AND RELATED GOALS NEEDED TO DETERMINE HIGH
     IMPACT AREAS FOR R AND D PLANNING, (2) ESTABLISH PRIORITIES AMONG
     SUB-OBJECTIVES AND WORK UNITS SO THAT RATIONAL BUDGET ALLOCATION DECISIONS
      CAN BE MADE, (3) HELP IMPROVE THE DECISION/BUDGETING PROCESS AT VARIOUS
     ORGANIZATIONAL LEVELS AT IERL-RTP AND AT DIFFERENT POINTS IN THE PLAN
     NING CYCLE, (4) INVESTIGATE THE END-USES OF R AND D WORK AND ESTABLISH A S
     YSTEM FOR INFORMATION DISSEMINATION OUTSIDE THE LABORATORY CONSISTENT WITH
     THE MISSION AND RESOURCES OF IERL-RTP,
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II-452

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PREDICTING RESPONSE OF A NATURAL SYSTEM TO URANIUM EXTRACTION, OAKVILLE
AQUIFER SYSTEM, TEXAS
   START/ COMPL DATE :    09/77 - 09/78 : FUNDING : EST, - FY   77  / $  105000
    TASK/EPA CODE :B6238-638    / R805357-01  (GRANT)  PRIOR  FY76 /          1
   PROJECT OFFICER : J    HUBBARD
   INVESTIGATORS :   W E GALLOWAY                    UNIV, OF TEXAS
                     C D HENRY                       UNIV, OF TEXAS
                     C W KREITLER                    UNIV, OF TEXAS
   MILE: 07/77 -FUNDING PACKAGE SUBMITTED
         09/77 -AWARD FUNDS FOR PROJECT
         00/00 -FINAL REPORT RECEIVED
     THE PRINCIPAL OBJECTIVE OF THIS PROJECT IS TO DETERMINE AND DOCUMENT FOR
     ONE URANIUM-BEARING AQUIFER SYSTEM THE INTERRELATIONSHIPS BETWEEN AQUIFER
     GEOMETRY, HYDROLOGY, HYDROCHEMISTRY, MINERALOGY, AND URANIUM MINERALIZATI
     ON AND TO DETERMINE HOW THIS NATURAL SYSTEM WILL RESPOND TO LOCAL CHEMICAL
     OR PHYSICAL STRESSES INDUCED BY URANIUM MINING, THE IMPLICATIONS OF P
     ROJECT RESULTS FOR THE DESIGN OF MONITORING SYSTEMS WILL BE EVALUATED, THE
     PROGRAM IS EXPECTED TO BE STARTED IN 1977,
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805359

II- 453

The National Council on Radiation Protection and Measurements (NCRP) seeks to collect analyze, develop and disseminate information and recommendations on radiation protection and measurements and to foster cooperation among organizations concerned with radiation protection and measurements. After identification of an area in which NCRP recommendations would be useful, the Council initiates research aimed at:

1. Assessment of the available information which is pertinent to the problem.
2. Identification of areas where more information is needed.
3. Synthesis of present knowledge relevant to the problem area into practical recommendations on radiation protection and measurement which also highlight areas in need of further study.

This project is concerned with the following topics (1) quantities, units, measurement techniques, biological effects and exposure criteria for radiofrequency electromagnetic radiation,(2) radiation hazards resulting from the release of radionuclides into the environment(with particular attention directed to examination of the problems associated with the release of iodine-129,(3) bioassay for the assessment of control of intake of radionuclides and(4) radon sources and dosimetry.

Initial work on NCRP Studies are carried out by scientific committees. If preliminary study by a scientific committee justifies it, work is begun on the formulati of draft recommendations. This involves a detailed examination of pertinent information already available, identification of areas in which information is meager or unavailable and an assessment of the scientific thinking on the problem at hand. The final result of the scientific committee's work is usually a draft of a proposed NCRP report. This draft is submitted to the members of the Council for review, modified on the basis of Council Member's comments and finally, after membership approval, published.

805363

The mortality from primary tumors of the skin in the U.S., Canadian, and British populations under the age of 65 has been steadily increasing for many years. This is the result of the increasing incidence of malignant melanoma. The situation is complicated by inadvertant modification of the upper atmosphere by human activities (high flying aircraft, flourocarbons, etc.) which are expected to lead to an increase in the flux of ultra-violet light at ground level. Regulations to control this modification have thus to be made against a background of long term and progressive changes. It is our purpose to examine the existing U.S. data, published and unpublished, and disentangle the components of the rising rates-generation differences, changes in the rate constant, and inter-cohort differences consequent on these factors. When this is done, we can make projections from defined models against which the course of events can be compared.

MARINE PROTOZOAN MICROSOMAL ACTIVATION OF OIL POLLUTANTS TO MUTAGENS

START/ COMPL DATE :   09/77 - 08/78 : FUNDING : EST. - FY   77 / $ 25000
TASK/EPA CODE :1Q625F-1-04   / R805364-01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER : N L RICHARDS
INVESTIGATORS :   D G LINDMARK   ROCKEFELLER UNIVERSITY
MILE: 10/77 -VISIT ERL GULF BREEZE FOR PLANNING SESSION
      08/78 -FINAL REPORT

THE PROJECT CONSISTS OF THE ISOLATION OF MICROSOMES FROM VARIOUS MARINE PROTOZOA. WORK WILL BE DONE ON A SMALL SCALE UNDER LABORATORY CONDITIONS.

II-456

REMOTE CONTROL HOVERCRAFT OR VEHICLE TO PLUG HAZARDOUS LEAKS

START/ COMPL DATE :   07/77 - 06/80 : FUNDING : EST, - FY   77 / $ 50000
TASK/EPA CODE :B610A-212   / R805365-01 (GRANT) PRIOR FY76 /   1
PROJECT OFFICER : J E BRUGGER
INVESTIGATORS :   H A GUSTAFSON   OXNARD CITY FIRE DEPARTMENT
MILE: 06/77 -FUNDING PACKAGE SUBMITTED
07/77 -AWARD FUNDS FOR PROJECT
10/77 -APPLY INCREMENTAL FUNDS FOR PHASE A
05/78 -COMPLETE PHASE A
05/78 -INITIATE AND INCREMENTALLY FUND PHASE B
10/78 -INCREMETALLY FUND PHASE B
11/79 -COMPLETE PHASE B
06/80 -FINAL REPORT RECEIVED

THE GRANTEE HAS PROPOSED A TWO-PHASE EFFORT TO DESIGN, DEVELOP, TEST, AND EVALUATE A REMOTELY PILOTED, CENTRIFUGAL FAN THRUST PROPELLED, JET SKIRT NOZZLE FORWARD/SIDE MOTION CONTROLLED, MODERATE WEIGHT, HOVERCRAFT-TYPE OF VEHICLE FOR MOVING INTO A HAZARDOUS SPILL CONTAMINATED AREA OVER ROUGH TERRAIN AND PIPE RUNS (AS WELL AS OVER FLAT LAND) TO CARRY AN ON-BOARD TV CAMERA AND ONE OR MORE REMOTELY OPERATED DEVICES FOR PLUGGING LEAKS, CRIMPING PIPES, TURNING VALVES, ETC, CLOSE TO THE SITE OR ORIGIN OF THE SPILL AND THEREBY TO REDUCE THE RISK TO RESPONSE PERSONNEL IN ACQUIRING FACTUAL DATA ON THE SPILL OR IN UNDERTAKING CONTROL MEASURES, THE NEED FOR SUCH A SYSTEM IS RECOGNIZED BY ALL CONCERNED WITH THE CONTROL OF HAZARDOUS SPILLS AND THE PROPOSAL DOCUMENTS SOME SPECIFIC INSTANCES WHERE AVAILABILITY WOULD HAVE PREVENTED INJURIES AND EVEN SAVED LIVES, ESPECIALLY ON FIRST-ON-THE-SCENE RESPONSE PERSONNEL, IN PHASE A (DESIGN AND PILOT MODEL), A THOROUGH EVALUATION OF THE PROPULSION OPTIONS AND CAPABILITY TRADE-OFFS WILL BE UNDERTAKEN, FOLLOWED BY THE FABRICATION AND TESTING OF EITHER A PILOT MODEL OR A STRIPPED-DOWN FULL-SCALE SYSTEM, IN PHASE B (ENGINEERING PROTOTYPE CONSTRUCTION AND EVALUATION), A FULL-SCALE SYSTEM--EQUIPPED NOT ONLY WITH A TV CAMERA BUT WITH ONE OR MORE CONTROL DEVICES (PLUG, CRIMPER)--WILL BE CONSTRUCTED, EVALUATED, DEMONSTRATED, AND DELIVERED.

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WATER QUALITY AND EUTROPHICATION STUDIES IN SANTA ROSA SOUND IN THE
PROXIMITY OF ESCAMBIA AND SANTA ROSA COUNTIES, FLORIDA
   START/ COMPL DATE :    09/77 - 08/79 : FUNDING : EST. - FY   77  / $   28333
    TASK/EPA CODE 1Q608C-1-02   / R805366-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : G E  WALSH
   INVESTIGATORS :   G A MOSHIRI                        STATE UNIVERSITY OF FLA. SYS.
   MILE: 07/78 -REPORT
     THE PROPOSED PROJECT IS INTENDED TO MONITOR WATER QUALITY PARAMETERS OVER
     A PERIOD OF TWO YEARS THAT WILL GIVE DETAILED INFORMATION CONCERNING THE
     PRESENT WATER QUALITY STATUS OF SANTA ROSA SOUND, ESCAMBIA-SANTA ROSA
     COUNTIES, FLORIDA, FROM BI-WEEKLY FIELD SAMPLES. WATER QUALITY PARAMETERS
     WILL BE MEASURED AGAINST A BACKGROUND OF PHYSICO-CHEMICAL DATA. THESE
     PARAMETERS INCLUDE B.O.D., INORGANIC AND ORGANIC CARBON, ALGAL CELL
     COUNTS AND TYPES, AND BACTERIAL NUMBERS AND SIZES. THE MAJOR TYPES OF
     PHOSPHATE AND NITROGENOUS SPECIES WILL BE DETERMINED AND CORRELATED WITH
     ALGAL POPULATION COMPOSITION AND PRIMARY PRODUCTION RATES (TO BE MEASU
     RED IN SITU BY THE 14C TECHNIQUE). THE EFFECTS OF NITROGEN-PHOSPHORUS ENRI
     CHMENT ON ALGAL PRODUCTIVITY WILL BE DETERMINED BY EMPLOYING THE PRIMARY P
     RODUCTIVITY MEASUREMENT TECHNIQUE ON IN SITU CULTURES ON A SEASONAL BASIS.
      IN ADDITION TO THE REGULAR SAMPLING REGIMEN, DUAL STUDIES WILL BE CO
     NDUCTED TO DELINEATE DAILY TRENDS IN WATER QUALITY PARAMETERS. PILOT INVES
     TIGATIONS WILL BE CONDUCTED PERIODICALLY TO INDICATE AREAS NEEDING FURTHER
     INVESTIGATION. IT IS ANTICIPATED THAT THE INFORMATION OBTAINED FROM THE
     PROPOSED STUDY WILL AID IN THE ESTABLISHMENT OF RECOMMENDATIONS FOR THE
     IMPROVEMENT OF WATER QUALITY IN SANTA ROSA SOUND.
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USE OF LICHENS AS PREDICTORS AND INDICATORS OF AIR POLLUTION FROM A COAL-FIRED POWER PLANT

START/ COMPL DATE : 09/77 - 08/80 : FUNDING : EST. - FY 77 / $ 13604
TASK/EPA CODE :M625A-020 / R805367-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : E PRESTON
INVESTIGATORS : S EVERSMAN MONTANA STATE UNIVERSITY
MILE: 07/80 -FINAL REPORT

TWO LICHEN SPECIES NATIVE TO SOUTHEAST MONTANA SHOWED REDUCED RESPIRATION RATES AND ALGAL CELL PLASMOLYSIS AND BLEACHING WHEN EXPOSED TO .02, .04, AND .07 PPM SO2 (GEOMETRIC MEANS) ON A FIELD FUMIGATION SITE. THE MAJOR OBJECTIVE OF THE CURRENT PROJECT IS TO COLLECT THESE SAME TWO LICHEN SPECIES TO BE OBSERVED AS BIOLOGICAL MONITORS OF SO2 EMISSIONS FROM TWO COAL-FIRED POWER PLANTS IN COLSTRIP, MONTANA. LICHEN COMMUNITY INFORMATION IS ALSO BEING COLLECTED IN ORDER TO DETECT ANY CHANGES IN EPIPHYTIC AND SOIL LICHEN COMMUNITIES AS COAL BURNING PROCEEDS IN THIS AREA. ALL THE LICHEN INFORMATION WILL BE INTEGRATED WITH PLANT COMMUNITY DATA GATHERED BY OTHER RESEARCHERS IN THE AREA IN ORDER TO DETERMINE EFFECTS OF SO2 EMISSIONS (AND OTHER COAL-BURNING POLLUTANTS) ON PONDEROSA PINE-GRASSLAND ECOSYSTEMS.

II-459

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ALGAE IN OPEN, DRINKING WATER RESERVOIRS AND TOXICITY OF SCHIZOTHRIX
CALCICOLA
   START/ COMPL DATE :    08/77 - 08/78 : FUNDING : EST. - FY   77  / $   30612
    TASK/EPA CODE :D6148-036     / R805368-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : E C  LIPPY
   INVESTIGATORS :    J L SYKORA                          UNIV. OF PITTSBURGH
                      J B ANDELMAN                        UNIV. OF PITTSBURGH
                      R B YEE                             UNIV. OF PITTSBURGH
                      I   CAMPBELL                        UNIV. OF PITTSBURGH
   MILE: 10/77 -PROGRESS REPORT
         01/78 -PROGRESS REPORT
         04/78 -PROGRESS REPORT
         07/78 -FINAL REPORT
    THE OBJECTIVES OF THIS STUDY ARE (1) TO EVALUATE DISTRIBUTION OF ALGAE IN
    DRINKING WATER TREATMENT PLANTS, (2) INVESTIGATE SOURCES AND OCCURRENCE
    OF ENDOTOXINS IN DRINKING WATER, (2) PROVIDE USEFUL DATA ON TOXICITY OF
    ONE SPECIES OF BLUE GREEN ALGA. THE GOAL OF THIS STUDY IS TO PROVIDE
     GOVERNMENTAL AGENCIES RESPONSIBLE FOR DRINKING WATER QUALITY AND
    OTHERS WITH VALID AND RELIABLE INFORMATION ON ALGAL TOXICITY AND THUS
    PROVIDE NEEDED CRITERIA FOR DEVELOPING LIMITS FOR ALGAE AND ENDOTOXINS IN
    DRINKING WATER. THE PROJECT INCLUDES A FIELD STUDY CONCERNED WITH DISTRI
    BUTION OF ALGAE AND ENDOTOXINS IN OPEN, FINISHED DRINKING WATER RESERVOIRS
    AND SELECTED DRINKING WATER TREATMENT PLANTS IN ALLEGHENY COUNTY,
    PA. THE LABORATORY STUDY FOCUSES ON TOXICITY OF SCHIZOTHRIX CALCICOLA
    INCLUDING ISOLATION, IDENTIFICATION, BIOASSAYS AND MEASUREMENT OF TOXINS
    PRODUCED BY THIS SPECIES.
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II-460

INVESTIGATION OF THE EFFECTS OF COAL-FIRED POWER PLANT EMISSIONS ON TISSUE STRUCTURE OF SELECTED BIRD SPECIES - BIRDS AS INDICATO

START/ COMPL DATE : 07/77 - 07/80 : FUNDING : EST. - FY 77 / $ 27159
TASK/EPA CODE :M625A-021 / R805370-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : E PRESTON
INVESTIGATORS : M D KERN COLL. OF WOOSTER
MILE: 07/80 -FINAL REPORT

THE OBJECTIVE OF THIS PROJECT IS TO IDENTIFY SPECIES OF GRASSLAND BIRDS AND/OR THEIR ORGAN-SYSTEMS WHICH ARE PARTICULARLY SENSITIVE TO THE EMISSIONS OF COAL-FIRED POWER PLANTS AND CAN BE USED TO MONITOR AND INDICATE AIR QUALITY; AND PREDICT THE IMPACT OF CHRONIC, LOW-LEVEL, NON-LETHAL STACK EMISSIONS ON THE SURROUNDING ECOSYSTEM. THE STUDY SITE IS A GRASSLAND ECOSYSTEM IN COLSTRIP, MONTANA, IN WHICH TWO COAL-FIRED POWER PLANTS OPERATE. REPRESENTATIVE GRASSLAND BIRDS SELECTED FOR STUDY AT THE SITE ARE THE WESTERN MEADOWLARK (STURNELLA NEGLECTA), MOURNING DOVE (ZENAIDURA MACROURA), LARK BUNTING (CALAMOSPIZA MELANOCORYS), VESPER SPARROW (POOECETES GRAMINEUS, AND LARK SPARROW (CHONDESTES GRAMMACUS). IN EACH CASE, THE HISTOLOGY OF THE FOLLOWING TISSUES IS EXAMINED BEFORE (1975-1979) THE POWER PLANTS HAVE GONE ON-LINE: (1) TISSUES WHICH ARE STRESS INDICATORS: THE ADRENAL AND THYROID GLANDS; (2) TISSUES WHICH BELONG TO THE IMMUNE SYSTEM: THE BURSA OF FABRICIUS, THYMUS, AND SPLEEN; (3) DETOXIFYING TISSUES: THE LIVER, KIDNEY, AND LUNG; AND (4) REPRODUCTIVE TISSUES: THE TESTIS, OVARY, AND OVIDUCT. THIS HISTOLOGICAL INFORMATION WILL BE INTEGRATED WITH (1) MEASURES OF CARCASS AND TISSUE COMPOSITION AND OTHER GROSS MEASUREMENTS MADE ON THE SAME BIRDS, AND (2) INFORMATION ON THE AIR QUALITY, WEATHER, AND OTHER ORGANISMS IN THE SAME IMPACTED ECOSYSTEM, IN ORDER TO IDENTIFY RELATIONSHIPS WHICH ARE USEFUL FOR (1) PREDICTING THE BIOLOGICAL EFFECTS OF GIVEN RATES OF POLLUTION CHALLENGE, AND (2) SITING COAL-FIRED POWER PLANTS IN THE GREAT PLAINS REGION.

IV-461

INVESTIGATION OF A FLUID BED CARBON REGENERATION SYSTEM OF MANCHESTER,
NEW HAMPSHIRE
START/ COMPL DATE : 10/77 - 12/80 : FUNDING : EST. - FY 77 / $ 451800
TASK/EPA CODE :C614A-7149 / R805371-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : J DEMARCO
INVESTIGATORS : R BEAURIVAGE MANCHESTER CITY WATER WORKS
D PARIS MANCHESTER CITY WATER WORKS
D KITTREDGE MANCHESTER CITY WATER WORKS
MILE: 11/78 -INTERIM REPORT
12/80 -FINAL REPORT

THE OBJECTIVES OF THIS PROJECT WILL BE TO EVALUATE BOTH THE COST AND PERFORMANCE OF A CARBON REGENERATION SYSTEM UTILIZING FLUID BED PRINCIPLES, THE COST AND CAPABILITIES OF A SEMIAUTOMATIC SYSTEM FOR CARBON HANDLING, AND THE ADSORPTIVE EFFECTIVENESS OF VIRGIN CARBON AND REGENERATED CARBON FOR REMOVAL OF CHLORINATED ORGANIC SUBSTANCES FROM DRINKING WATER. IT HAS RECENTLY BEEN ESTABLISHED THAT THE COMBINATION OF CHLORINE PLUS NATURAL PRECURSOR SUBSTANCES RESULTS IN THE FORMATION OF SUSPECTED HUMAN CARCINOGENS KNOWN AS TRIHALOMETHANES (CHLOROFORM, BROMOFORM, ETC.) GRANULAR ACTIVATED CARBON IS RECOGNIZED AS BEING AN EFFECTIVE MEANS OF REMOVING BOTH TRIHALOMETHANES AND PRECURSORS, BUT LITTLE IS KNOWN ABOUT THE COST AND REMOVAL PERFORMANCE UNDER ACTUAL OPERATING CONDITIONS. THE GENERAL APPROACH WILL BE TO UTILIZE ONE OF THE FOUR CARBON FILTERS AT THE TREATMENT PLANT AS A TEST FILTER, TO FILL ONE-HALF OF THE FILTER WITH VIRGIN CARBON, THE REMAINING HALF WITH ONCE-REGENERATED CARBON, AND THEN TO COMPARE THE RATE OF TRIHALOMETHANE REMOVAL BETWEEN THE FILTERS OVER A REPEATED NUMBER OF REGENERATION CYCLES. CONSTRUCTION OF THE FACILITY IS SCHEDULED TO BEGIN IN APRIL, 1978 AND TO BE COMPLETED IN THE FALL OF 1978. THE CARBON WILL THEN BE REGENERATED ON A NEAR CONTINUOUS BASIS OVER A TWO-YEAR MONITORING AND EVALUATION PERIOD BEGINNING IN JANUARY, 1979. INVESTIGATIVE WORK IS TO BE CARRIED OUT BY THE WATER SUPPLY STAFF OF THE MANCHESTER WATER WORKS WORKING IN CONJUNCTION WITH THE WATER SUPPLY RESEARCH STAFF OF EPA.

II-462

CONTINUOUS BIOREACTOR FOR REGENERATION OF ACTIVATED CARBON

START/ COMPL DATE : 07/77 - 07/78 : FUNDING : EST. - FY 77 / $ 10316
TASK/EPA CODE :F610C-05 / R805373 (GRANT) PRIOR FY / 1
PROJECT OFFICER : N PLAKS
INVESTIGATORS : S H DREW VIRGINIA POLY. INST. & ST. U.
MILE: 07/77 -START GRANT
07/78 -COMPLETE GRANT

OBJECTIVE: TO DEVELOP, AT LABORATORY SCALE, TECHNOLOGY FOR CONTINUOUSLY REGENERATING, BY BIOLOGICAL ACTION, ACTIVATED CARBON FOR THE CONTROL OF COKE PLANT WASTEWATERS. APPROACH: THE CONCEPT PROPOSED IN THIS PROJECT IS TO SHOW THAT THE CARBON CAN BE REGENERATED CONTINUOUSLY, IN A FLUIDIZED BED REACTOR, BY THE ACTION OF BACTERIA. THE BIOMASS WILL BE OPTIMALLY DEPOSITED AND MAINTAINED BY SHEAR FORCES UPON THE SURFACE OF THE ACTIVATED CARBON SO THAT THERE IS BALANCE BETWEEN DIFFUSION THROUGH THE MICROBIAL SHELL WITH SOME METABOLIC DESTRUCTION OF THE CONTAMINANTS AND SOME ADSORPTION ONTO THE CARBON. THE BENEFITS FROM THIS FLUIDIZED-BED BIO-REACTOR IN COMPARISON TO FIXED-BED ADSORPTION ARE CONTINUOUSLY HIGH ADSORPTIVITY INSTEAD OF DECLINING PERFORMANCE AS IN A FIXED BED AND THE MINIMIZATION OF COSTLY, ENERGY-INTENSIVE THERMAL REGENERATION WITH ITS ATTENDANT ATTRITION. OUTPUT: THE OUTPUT WILL BE IN THE FORM OF A FINAL REPORT.

Ⅱ - 463

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AMBIENT HYDROCARBON AND OZONE MEASUREMENTS NEAR A REFINERY

   START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST, - FY   77  / $   79000
    TASK/EPA CODE :G625B-EA-01  / R805376-01  (GRANT)  PRIOR  FY76 / $   650001
   PROJECT OFFICER : J J  BUFALINI
   INVESTIGATORS :   H   WESTBERG                    WASHINGTON STATE UNIVERSITY
                     M W HOLDREN                     WASHINGTON STATE UNIVERSITY
   MILE: 03/79 -FINAL REPORT
     THE PRIMARY OBJECTIVE OF THIS STUDY IS TO EXAMINE THE IMPACT OF A PET
     ROLEUM REFINERY ON DOWNWIND AMBIENT AIR QUALITY, MONITORING THE PRODUCTION
     OF SECONDARY GASEOUS POLLUTANTS SUCH AS OZONE AND OTHER OXIDANTS IN THE
      PLUME IS AN IMPORTANT GOAL, BOTH GROUND AND AIRCRAFT MONITORING SYSTEMS
     WILL BE EMPLOYED TO RECORD CHEMICAL AND PHYSICAL CHANGES IN THE PLUME AS
     IT DISPERSES DOWNWIND OF THE REFINERY, DETAILED ANALYSES FOR HYDROCARB
     ONS, THE OXIDES OF NITROGEN, OZONE, CARBON MONOXIDE, PAN AND SULFUR DIOXID
     E WILL BE PERFORMED, THE FIELD PROGRAM WILL CONDUCTED DURING THE SUMMER OF
      1977 NEAR A REFINERY THAT IS ISOLATED FROM OTHER MAJOR HYDROCARBON
     EMISSION SOURCES,
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II-464

INTERACTIONS OF ACID SULFATES AND THE RESPIRATORY SYSTEM

START/ COMPL DATE : 10/77 - 09/80 : FUNDING : EST. - FY 77 / $ 284900
TASK/EPA CODE :H601D-7367 / R805378-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : - HAZUCHA

INVESTIGATORS :	R	FRANK	UNIV. OF WASHINGTON
	T	LARSON	UNIV. OF WASHINGTON
	D	COVERT	UNIV. OF WASHINGTON
	M	MORGAN	UNIV. OF WASHINGTON
	J	KOENIG	UNIV. OF WASHINGTON
	D	HOLUB	UNIV. OF WASHINGTON
	R	CHARLSON	UNIV. OF WASHINGTON

OBJECTIVES: A) ASSESS THE IMPORTANCE OF NH3 IN NEUTRALIZING INHALED H2SO4 AND IN ALTERING THE IRRITANT EFFECTS ON THE RESPIRATORY SYSTEM, B) COMPARE THE RELATIVE IRRITANCY IN GUINEA PIGS OF TWO SIZES OF H2SO4 AS ENCOUNTERED IN COMMUNITY AIR (ACCUMULATION MODE) ON PULMONARY FUNCTION IN HEALTHY YOUNG ADULTS, ADULTS 55 YEARS AND OLDER AND PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD). APPROACH: A) THE CONCENTRATION OF ENDOGENOUS NH3 IN THE RESPIRATORY SYSTEM AND THE DEGREE AND RATE OF NEUTRALIZATION OF INHALED H2SO4 AEROSOLS WILL BE MEASURED IN HUMAN SUBJECTS AND DOGS. CATHETER PROBES FOR IN VIVO SENSING OF THESE CHEMICAL PARAMETERS ARE BEING DEVELOPED PRESENTLY. MEASUREMENTS WILL BE MADE ON SUBJECTS IN THE HUMAN EXPOSURE STUDIES: B) SEPARATE GROUPS OF LIGHTLY ANESTHETIZED GUINEA PIGS WILL BE EXPOSED TO TWO SIZES OF H2SO4 AEROSOL; NUCLEI MODE (0.01 TO 1.0 MICRON DIAMETER) AND ACCUMULATION MODE (0.1 TO 1.0 MICRON) AT 100-200 MICRON/CU M. AS A MEASURE OF RESPONSE PLEURAL PRESSURE, TIDAL VOLUME AND FLOW WILL BE MEASURED IN A PLETHYSMOGRAPH USING A PLEURAL CATHETER. ANOTHER GROUP WILL BE EXPOSED DURING CO2-INDUCED HYPERPNEA AS SUBSTITUTE FOR EXERCISE. CLEARANCE OF INSOLUBLE AEROSOLS AS A MEASURE OF RESPONSE WILL BE STUDIED. C) THE GROUPS OF HEALTHY VOLUNTEERS WILL BE EXPOSED TO 100 MICRONS/CU M H2SO4 ACCUMULATION MODE AEROSOL. ELDERLY VOLUNTEERS AND PATIENTS WITH COPD WILL BE EXPOSED TO 1 PPM SO2 AND 1 MG/CU M NACL AEROSOL AT RH APPROXIMATELY 75 PERCENT FOR COMPARISON WITH PREVIOUS STUDIES WITH HEALTHY VOLUNTEERS. EXPOSURE WILL BEGIN AT REST. EXERCISE WILL FOLLOW. EXPOSURE WILL BE VIA MASK. PULMONARY FLOW RESISTANCE, DYNAMIC COMPLIANCE, TOTAL RESPIRATORY RESISTANCE AND PARTIAL FLOW-VOLUME MANEUVERS WILL BE USED TO ASSESS RESPONSE TO THE EXPOSURE.

II -465

805379

The principal objective of this project is to estimate the increase of skin cancer that will result from increasing ultraviolet radiation by depleting stratospheric ozone. With the cooperation of the National Center of Health Statistics, we propose to use three new sources of data:

1) cases of skin cancer (largely nonmelanoma) and of keratosis observed by dermatologists in the special Health and Nutrition Examination Survey (HANES) in 65 different localities in the United States.

2) cases of skin cancer, separately melanoma and nonmelanoma by site, observed in the National Ambulatory Medical Care Survey by a sample of physicians in different localities in the United States.

3) cases of skin cancer, separately melanoma and non melanoma by site, observed in the sample survey of Discharges from Short-Stay Hospital Care in different localities in the United States.

II-466

DEVELOPMENTAL EVALUATION OF RAPID MICROBIAL BIOASSAYS FOR AQUATIC
HERBICIDES, PESTICIDES AND HEAVY METALS
START/ COMPL DATE : 07/77 - 07/78 : FUNDING : EST. - FY 77 / $ 50000
TASK/EPA CODE :M608A-022 / R805383-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : T SHIROYAMA
INVESTIGATORS : G A MCFETERS
MILE: 07/79 -FINAL REPORT MONTANA STATE UNIVERSITY

TWO RECENTLY DEVELOPED ALGAL BIOASSAYS FOR TOXIC CHEMICALS IN WATER WILL BE COMPARED WITH THE STANDARD ALGAL ASSAY PROCEDURE: BOTTLE TEST. TEST CHEMICALS WILL INCLUDE COMMONLY USED HERBICIDES, PESTICIDES AND SOME HEAVY METALS. THE RESULTS FROM THE THREE TESTS WILL BE EVALUATED IN TERMS OF EASE OF PERFORMANCE, COMPARABILITY OF RESULTS, EXPENSE AND THE TIME REQUIRED TO CARRY OUT THE PROCEDURES. THE THREE TEST PROCEDURES ARE AS FOLLOWS: 1. THE ALGAL ASSAY PROCEDURE: BOTTLE TEST, COMMONLY USED AT PRESENT AND RECOMMENDED BY THE USEPA. 2. A TEST THAT USES THE INTENSITY OF BACTERIAL LUMINESCENCE AS AN INDEX OF ALGAL OXYGEN EVOLUTION AND HENCE PHOTOSYNTHESIS WHEN THESE TWO ORGANISMS ARE MIXED IN THE PRESENCE OF TEST CHEMICALS. 3. A PROCEDURE THAT EMPLOYS A POLAROGRAPHIC OXYGEN ELECTRODE TO DETERMINE THE RATE OF ALGAL OXYGEN PRODUCTION AS IN #

II-467

SUSCEPTIBILITY OF GENETICALLY DEFINED STOCK OF FISH TO CHEMICAL CARCINOGENS

START/ COMPL DATE :   09/77 - 08/78 : FUNDING : EST. - FY   77 / $ 57143
TASK/EPA CODE :0625F-1-08   / R805389-01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER : N L RICHARDS
INVESTIGATORS :   K D KALLMAN   OSBORN LABS. FOR MARINE SCIS.
MILE: 09/78 -REPORT PRELIMINARY SCREENING DATA
      09/79 -REPORT ON FINAL SCREENING OF FIVE COMPOUNDS

THE EFFECTS OF A NUMBER OF POLYCYCLIC AROMATIC HYDROCARBONS (PAH), WHICH ARE SIGNIFICANT POLLUTANTS IN THE NATURAL ENVIRONMENT, WILL BE STUDIED IN GENETICALLY DEFINED STOCKS OF FISH OF XIPHOPHORUS AND RIVULUS. MANY OF THESE COMPOUNDS ARE INVOLVED IN CHEMICAL CARCINOGENESIS IN MAMMALS. OUR AIM IS TO DETERMINE WHETHER STRAIN DIFFERENCES EXIST IN SUSCEPTIBILITY TO PAH-INDUCED CARCINOGENESIS AND WHETHER THIS CAN BE CORRELATED WITH THE DEGREE OF HETEROZYGOSITY. SOME OF THE GENETICALLY DEFINED STOCKS MAY BECOME SENSITIVE INDICATORS FOR CERTAIN KINDS OF POLLUTANTS.

MONITORING PLANT COMMUNITY CHANGES DUE TO FOSSIL FUEL POWER PLANTS IN
SOUTHEASTERN MONTANA
START/ COMPL DATE : 07/77 - 07/80 : FUNDING : EST. - FY 77 / $ 52766
TASK/EPA CODE :1M625A-023 / R805391-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : E PRESTON
INVESTIGATORS : J E TAYLOR
MILE: 07/80 -FINAL REPORT MONTANA STATE UNIVERSITY

OBJECTIVES: A. TO CONTINUE TO MONITOR AIR POLLUTION EFFECTS UPON NATIVE GRASSLAND VEGETATION IN AREAS AFFECTED BY FOSSIL FUEL POWER PLANTS AND ON AREAS ARTIFICIALLY STRESSED WITH AIR POLLUTANTS; B. TO SUPPLY BASELINE INVENTORY INFORMATION, INCLUDING AERIAL PHOTOGRAPHY AND ITS INTERPRETATION, TO A VARIETY OF SCIENTISTS, LAND USERS AND MANAGERS IN EASTERN MONTANA; C. TO PROVIDE RIGOROUS DATA FOR SIMULATION MODELS WHICH CAN BE USED TO PREDICT BIOENVIRONMENTAL CHANGES DUE TO FOSSIL FUEL POWER GENERATION IN OTHER AREAS. APPROACHES: AERIAL AND GROUND PHOTOGRAPHY, SPECIES DIVERSITY (NUMBER AND COVER), AND PHENOLOGY WILL BE RELATED TO POLLUTION STRESSES AND "NORMAL" VARIATION IN COMMUNITY STRUCTURE. PLANS: TWO YEARS' ADDITIONAL FIELD OBSERVATIONS WILL BE INCORPORATED INTO THE COAL-FIRED POWER PLANT PROTOCOL AND A VEGETATIONAL MONITORING SYSTEM.

II-469

NATIONAL CONFERENCE ON MANAGEMENT OF NITROGEN IN IRRIGATED AGRICULTURE

START/ COMPL DATE : 07/77 - 06/78 : FUNDING : EST. - FY 77 / $ 31460
TASK/EPA CODE :L6617A-05 / R805394-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : A G HORNSBY
INVESTIGATORS : P F PRATT UNIV. OF CALIFORNIA
R L BRANSON UNIV. OF CALIFORNIA
MILE: 05/78 -CONFERENCE

A NATIONAL CONFERENCE ON MANAGEMENT OF NITROGEN IN IRRIGATED AGRICULTURE, TO BE HELD IN THE SPRING OF 1978, IS PROPOSED. THE OBJECTIVES ARE (1) PRESENT RESULTS OF RESEARCH PROJECT THAT DEAL WITH MANAGING NITROGEN IN RELATION TO CROP USE EFFICIENCY AND TO NITRATE IN DRAINAGE WATER AND (2) TO PROVIDE A FORUM FOR THE DISCUSSION OF NITROGEN MANAGEMENT ALTERNATIVES FOR THE CONTROL OF NITRATE IN IRRIGATION RETURN FLOWS. THIS CONFERENCE WILL BRING TOGETHER THE CONCEPTS AND RESULTS OF RESEARCH SPONSORED BY USEPA AND NSF AND THE RESEARCH OF ARS-USDA AND STATE AGRICULTURAL EXPERIMENT STATIONS. THE INFORMATION WILL BE GEARED TO THE NEEDS OF USERS OF MANAGEMENT INFORMATION RATHER THAN FOR RESEARCHERS. THE CONFERENCE WILL BE PLANNED BY A SEVEN-PERSON COMMITTEE BUT WILL BE MANAGED BY THE PRINCIPAL AND CO-PRINCIPAL INVESTIGATORS. THE BENEFITS OF THE CONFERENCE WILL BE MORE RATIONAL AND EFFECTIVE PRACTICES TO ADVISE FARMERS AND THE DEVELOPMENT OF MORE RATIONAL AND EFFECTIVE CONTROL STRATEGIES BY CONTROL AGENCIES AT ALL LEVELS OF GOVERNMENT.

CRITICAL REVIEW OF VIRUS REMOVAL BY COAGULATION AND PH

START/ COMPL DATE : 06/77 - 06/78 : FUNDING : EST. - FY 77 / $ 15000
TASK/EPA CODE :C611B-7109 / R805399 (GRANT) PRIOR FY / 1
PROJECT OFFICER : J N ENGLISH
INVESTIGATORS : D J SPROUL UNIV. OF MAINE
MILE: 06/77 -PROJECT START
06/78 -PROJECT COMPLETION
10/78 -FINAL REPORT

THE PRINCIPAL OBJECTIVE OF THIS PROJECT IS TO CRITICALLY REVIEW THE LITERATURE ON REMOVAL AND INACTIVATION OF VIRUSES IN WATER BY CHEMICAL COAGULATION AND BY PH EXTREMES. A STATE-OF-THE-ART DOCUMENT WILL BE PREPARED ON THE REMOVAL AND/OR INACTIVATION OF VIRUSES BY THESE PROCESSES.

IV-471

CHEMICAL CONTROL OF WATER QUALITY IN DISTRIBUTION SYSTEMS

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   START/ COMPL DATE :    07/77 - 06/80 : FUNDING : EST, - FY   77  / $   55602
    TASK/EPA CODE :C614A-7179   / R805400-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R    THURMAN
   INVESTIGATORS :    J E SINGLEY                    STATE UNIVERSITY OF FLA, SYS,
   MILE: 04/77 -PACKAGE PROCESSED
         06/77 -GRANT AWARDED
         06/78 -INTERIM REPORT
         06/78 -CONTINUATION FUNDING PACKAGE PROCESSED
         06/79 -PROJECT COMPLETED
         09/79 -FINAL REPORT PUBLISHED
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THE OBJECTIVE OF THE PROPOSED WORK IS TO DEVELOP A METHOD OF CHEMICAL CONTROL OF POTABLE WATER QUALITY TO PREVENT DEGRADATION DURING PASSAGE THROUGH A DOMESTIC DISTRIBUTION SYSTEM, THE STUDY WILL HAVE TWO PHASES (1) FIELD AND (2) LABORATORY, THE FIELD PHASE WILL EVALUATE CHEMICAL PARAMETERS IN A VARIETY OF POTABLE WATER SUPPLIES AND CORRELATE THESE WITH QUALITY DEGRADATION, OF PARTICULAR CONCERN WILL BE THE RELATIONSHIP OF DEGRADATION WITH THE LANGELIER INDEX AND WITH THE ELECTRODE POTENTIAL. THE LABORATORY PHASE WILL FOLLOW THE SAME PROCEDURES WITH WATERS OF CONTROLLED COMPOSITION,

SOIL FILTRATION OF SEWAGE EFFLUENT OF A RURAL AREA

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START/ COMPL DATE :    08/77 - 12/79 : FUNDING : EST. - FY   77  / $   39802
 TASK/EPA CODE :L611C-51      / R805401      (GRANT)  PRIOR  FY    /        1
PROJECT OFFICER : L E  LEACH
INVESTIGATORS :    B R SABEY
                   N A EVANS                    COLORADO STATE UNIVERSITY
MILE: 08/77 -PROJECT INITIATION                 COLORADO STATE UNIVERSITY
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THE WORK PLAN IS PRESENTED IN TWO PARTS: (1) A CONTINUATION OF AN EXPERIMENTAL STUDY BEGUN IN 1976; AND (2) AN INVESTIGATION OF THE FEASIBILITY OF LENGTHENING THE OPERATING SEASON BY UNDER-SNOW FALL AND WINTER APPLICATION. THE FIRST EXPERIMENT IS A PLOT DESIGN TO COMPARE: (1) DRAINED VS. NON-DRAINED SITE TREATMENT; (2) ZERO VS. THREE INCHES OF APPLICATION PER WEEK; AND (3) LAGOON EFFLUENT VS. IRRIGATION DITCH WATER. POLLUTANT MOVEMENT IN THE SOIL PROFILE INTO DRAINAGE PIPE OR INTO GROUNDWATER WILL BE MONITORED. BIOMASS YIELD FROM THE PLOTS WILL BE MEASURED. WINTER IRRIGATION POSSIBILITIES WILL BE INVESTIGATED IN FIELD PLOTS PREPARED WITH RIDGES AND FURROWS OF VARIABLE DEPTH AND SPACING ON WHICH AN ICE COVER WILL BE FORMED AS SUPPORT TO THE SNOW OVERBURDEN. AS IN THE FIRST EXPERIMENTS, MOVEMENT OF POLLUTANTS THROUGH THE PROFILE WILL BE MONITORED.

II-473

DETERMINATION OF KINETICS OF PHOSPHORUS MINERALIZATION IN SOILS UNDER OXIDIZING CONDITIONS

START/ COMPL DATE : 07/77 - 07/78 : FUNDING : EST. - FY 77 / $ 29408
TASK/EPA CODE :L611C-48 / R805403-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : C G ENFIELD
INVESTIGATORS : R ELLIS KANSAS STATE UNIVERSITY
Y V SUBBARAO KANSAS STATE UNIVERSITY

THE OBJECTIVES OF THIS RESEARCH ARE TO DETERMINE THE KINETICS OF PHOSPHORUS MINERALIZATION IN SOILS UNDER OXIDIZING CONDITIONS AND TO RELATE THESE FINDINGS TO THE MOVEMENT OF PHOSPHORUS IN SOILS. THE REGENERATIVE CAPACITY OF SOILS TO FIX PHOSPHORUS WILL BE STUDIED BY DETERMINING THE INFLUENCE OF RATES OF APPLICATION OF PHOSPHORUS AND INTERVALS BETWEEN APPLICATION ON PHOSPHORUS COMPOUNDS FORMED AND RATES OF TRANSFORMATION OF COMPOUNDS IN SOILS. THE OBJECTIVES WILL BE ACCOMPLISHED BY THE FOLLOWING TECHNIQUES: 1. DETERMINATION OF PHOSPHATE POTENTIALS AT TIME INTERVALS FOR SOILS TO WHICH DIFFERENT RATES OF PHOSPHORUS HAVE BEEN ADDED. PHOSPHATE POTENTIALS WILL BE USED TO IDENTIFY THE PHOSPHORUS COMPOUNDS FORMED AND CHANGES WITH TIME. 2. PHOSPHORUS WILL BE ADDED TO THE SOILS AT DIFFERENT TIME INTERVALS TO DETERMINE THE BEST TIME INTERVAL TO KEEP THE AMOUNT OF SOLUBLE PHOSPHORUS IN THE SOIL SOLUTION AT A MINIMUM TO MINIMIZE THE MOVEMENT OF PHOSPHORUS IN SOILS. 3. SOURCES AND SOLUBILITIES OF ALUMINUM, IRON, AND CALCIUM IN THE SOILS WILL BE DETERMINED IN ORDER TO OBTAIN DATA FOR THESE CATIONS WHICH ARE INVOLVED IN PRECIPITATING PHOSPHORUS IN SOILS.

RESIDENCE TIME DISTRIBUTIONS, DISPERSION AND REENTRAINMENT IN A PILOT-SCALE ELECTROSTATIC PRECIPITATOR

START/ COMPL DATE : 10/77 - 10/79 : FUNDING : EST. - FY 77 / $ 42992
TASK/EPA CODE :F624A-067 / R805404-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : L SPARKS

INVESTIGATORS :		
	R M FELDER	UNIV. OF NORTH CAROLINA
	J K FERRELL	UNIV. OF NORTH CAROLINA
	K VERGHESE	UNIV. OF NORTH CAROLINA

MILE: 09/77 -AWARD GRANT
09/79 -PUBLISH DESIGN MODEL INCORPORATING RESULTS OF RESEARCH

GAS AND SOLID PHASE RESIDENCE TIME DISTRIBUTIONS IN THE NERC CONTROL SYSTEMS LABORATORY PILOT SCALE ELECTROSTATIC PRECIPITATOR WILL BE MEASURED BY TRACER RESPONSE ANALYSIS. THE RESULTS WILL BE USED TO CHARACTERIZE THE FLOW AND MIXING PATTERNS IN THE UNIT, AND TO PROVIDE A DATA BASE FOR TESTING AND MODIFYING A MODEL FOR ELECTROSTATIC PRECIPITATION FORMULATED BY THE SOUTHERN RESEARCH INSTITUTE. SPECIFIC SYSTEM PROPERTIES TO BE DETERMINED BY ANALYZING THE TRACER RESPONSES WILL INCLUDE THE FRACTIONAL SNEAKAGE, EXISTENCE AND EXTENT OF STAGNANT ZONES, EFFECTIVE AXIAL DISPERSION IN EACH PHASE, AND RATES OF REENTRAINMENT DUE TO PARTICLE IMPACTION ON THE COLLECTION PLATES, SWEEPAGE IN THE COLLECTION HOPPER, AND RAPPING. THE RESULTS WILL BE USED TO DETERMINE WHICH OF THE SPECIFIED PHENOMENA MIGHT ACCOUNT IN PART FOR DISCREPANCIES BETWEEN MEASURED COLLECTION EFFICIENCIES AND EFFICIENCIES PREDICTED BY THE SRI MODEL, AND THE MODEL WILL BE MODIFIED TO ACCOUNT FOR THE PHENOMENA FOUND TO BE SIGNIFICANT.

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MONITORING SEPTAGE ADDITION TO WASTEWATER TREATMENT PLANTS

    START/ COMPL DATE :     08/77 - 11/78 : FUNDING : EST. - FY   77  / $  143692
     TASK/EPA CODE :C611B-7094    / R805406-01  (GRANT)  PRIOR  FY   /         1
    PROJECT OFFICER : R P  BOWKER
    INVESTIGATORS :    B A SEGALL                         UNIV. OF LOWELL
                       C R OTT                            UNIV. OF LOWELL
                       W B MUELLER                        UNIV. OF LOWELL
    MILE: 08/77 -GRANT AWARDED
          09/78 -COMPLETE DATA COLLECTION AT 3 SITES
          11/78 -FINAL REPORT
      THE OBJECTIVE UF THE PROJECT IS TO EVALUATE THE EFFECTS OF SEPTIC TANK
      WASTE ADDITION TO SECUNDARY WASTEWATER TREATMENT FACILITIES. RESEARCH WILL
      DETERMINE THE EFFECTS OF ADDING INCREASING QUANTITIES OF THIS
      WASTE TO AN EXPERIMENTAL PLANT, A TRICKLING FILTER AND TO AN EXTENDED AE
      RATION PLANT. THE IMPACT ON SEDIMENTATION, BIOLOGICAL OXIDATION AND SLUDGE
      HANDLING PROCESSES WILL BE EVALUATED AT EACH LOADING RATE. THE RESEARC
      H ENTAILS MONITORING WASTE ADDITION TO THE THREE PLANTS. WASTE WILL BE ADD
      ED CONTINUOUSLY AT THE SEVERAL LOADING RATES, AND IN ADDITION PERIODICALLY
       AS SHOCK LOADS. PHYSICAL, CHEMICAL AND BIOLOGICAL CHARACTERISTICS OF
       THE WASTEWATER STREAM ARE TO BE MONITORED THROUGHOUT THE TREATMENT P
      LANTS. ANALYSES WILL BE PERFORMED AT THE SANITARY ENGINEERING LABORATORIES
      ON THE CAMPUS OF THE UNIVERSITY OF LOWELL, LOWELL, MASSACHUSETTS.
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II-476

EFFECT OF ENVIRONMENTAL POLLUTANTS ON SUSCEPTIBILITY OF TROUT TO VIRAL AND BACTERIAL PATHOGENS

START/ COMPL DATE : 09/77 - 09/79 : FUNDING : EST. - FY 77 / $ 42576
TASK/EPA CODE :M608A-033 / R805407-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : M D KNITTEL
INVESTIGATORS : J L FRYER OREGON STATE HIGHER EDUC. SYS
F M HETRICK UNIV. OF MARYLAND
MILE: 09/79 -FINAL REPORT

THE GENERAL OBJECTIVES OF THE STUDY ARE TO DETERMINE THE EFFECT OF SELECTED ENVIRONMENTAL POLLUTANTS ON SUSCEPTIBILITY OF TROUT TO INFECTIOUS HEMATOPOIETIC NECROSIS VIRUS (IHN), AND TO A BACTERIAL FISH PATHOGEN, SUCH AS FLEXIBACTER COLUMNARIS OR VIBRIO ANGUILLARUM. POLLUTANTS TO BE EXAMINED WILL INCLUDE THE TRIAZINE HERBICIDES, ATRAZINE AND PROMETRYNE, AND PULP MILL WASTES (E.G. SULFITE LIQUOR). SPECIFICALLY, THEY WILL BE EXAMINED FOR (1) THEIR TOXICITY FOR A CULTURED LINE OF SALMONID FISH CELLS AND THEIR EFFECT ON IHN VIRUS REPLICATION IN THESE CELLS, (2) THEIR ABILITY TO ACTIVATE OVERT DISEASE IN JUVENILE TROUT SUSPECTED TO BE CARRIERS OF THE VIRAL OR BACTERIAL PATHOGEN, (3) THEIR ABILITY TO INDUCE DISEASE IN YOUNG TROUT EXPOSED TO SUBLETHAL DOSES OF THE PATHOGENS, (4) THEIR EFFECT ON THE LENGTH OF THE INCUBATION PERIOD IN TROUT INFECTED WITH LETHAL DOSES OF ONE OF THE PATHOGENS, (5) THEIR EFFECT ON VIRUS TITERS OR BACTERIA COUNTS IN TISSUES OF EXPERIMENTALLY INFECTED FISH. FOR THE IN VIVO EXPERIMENTS, JUVENILE TROUT 10-13 CM LONG WILL BE HELD IN TANKS EQUIPPED FOR RECIRCULATION OF WATER AT 10 C. THE POLLUTANT AND/OR THE PATHOGEN UNDER STUDY WILL THEN BE INCORPORATED AT VARIOUS APPROPRIATE CONCENTRATIONS IN THE WATER, AND THE INDICATED OBSERVATIONS AND ASSAYS PERFORMED ON THE FISH TO PROVIDE INFORMATION ON THE STATED OBJECTIVES.

II -477

RESPONSE OF BIRDS TO ENVIRONMENTAL STRESS

START/ COMPL DATE :   09/77 - 09/79 : FUNDING : EST, - FY   77 / $ 29031
TASK/EPA CODE :M625A-024   / R805409-01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER : E   PRESTON
INVESTIGATORS :   D S FARNER   UNIV, OF WASHINGTON
                  J C WINGFIELD   UNIV, OF WASHINGTON
                  R S DONHAM   UNIV, OF WASHINGTON
MILE: 08/78 -FINAL REPORT

MICRO-RADIO COMPETITIVE-PROTEIN-BINDING AND MICRO-RADIOIMMUNOASSAYS FOR CORTISONE IN AVIAN PLASMA HAVE ALREADY BEEN DEVELOPED AND ADAPTED FOR FIELD INVESTIGATIONS IN THIS LABORATORY, SINCE THESE METHOD REQUIRE LESS THAN 100 MICROLITERS OF PLASMA, INDIVIDUAL BIRDS CAN BE SAMPLED, MARKED AND RELEASED FOR SUBSEQUENT CAPTURE AND SAMPLING, THE METHOD HAS BEEN "FIELD-TESTED" EXTENSIVELY ON WHITE-CROWNED SPARROWS, ZONOTRICHIA LEUCOPHRYS GAMBELII AND Z.L. PUGETENSIS, IT IS PROPOSED TO DEVELOP THIS SYSTEM FURTHER AS A MEANS OF "EARLY DETECTION" OF ENVIRONMENTAL STRESS IN POPULATIONS OF BIRDS, USING THESE METHODS, FIRST ON WHITE-CROWNED SPARROWS, THE FOLLOWING ARE PROPOSED: (1) PROCUREMENT OF BASE-LINE DATA ON DAILY CYCLES IN PLASMA CORTICOSTERONE; (2) PROCUREMENT OF ADDITIONAL DATA ON EFFECTS OF HANDLING AND HOLDING IN CAGES; (3) EXAMINATION OF EFFECTS OF INDUCED STRESS IN FIELD (DISTURBANCE OF FLOCKS, HARASSMENT OF TERRITORIAL BIRDS, ARTIFICIAL DISTURBANCE OF HABITAT...); (4) DETERMINATION OF METABOLIC CLEARANCE AND HALF-LIFE OF CORTICOSTERONE IN BIRDS; AND (5) OBSERVATION OF EFFECTS OF "ARTIFICIAL STRESS" (IMPLANTATION OF CORTICOSTERONE IN SILASTIC TUBES IN TERRITORIAL BIRDS), COMPARABLE MICROASSAYS HAVE BEEN DEVELOPED FOR TESTOSTERONE AND ESTRADIOL, THE AVIAN RADIOIMMUNOASSAY OF FOLLETT, SCANES, AND CUNNINGHAM FOR LUTEINIZING HORMONE (LH) HAS BEEN MODIFIED FOR PASSERINE BIRDS, ACCURATE ESTIMATES OF LH, SEX HORMONE AND CORTICOSTERONE CAN BE MADE FROM 200 MICROLITERS OF PLASMA FROM BIRDS THAT CAN BE BANDED AND RELEASED FOR SUBSEQUENT CAPTURE AND SAMPLING, LAPAROTOMY CAN BE PERFORMED ON THESE BIRDS FOR ASSESSMENT OF GONADAL STATE, FOR LH AND SEX HORMONES DATA COMPARABLE TO CORTICOSTERONE (1-3 AND 5) WILL BE OBTAINED, INSOFAR AS POSSIBLE, BY REPEATED SAMPLING OF INDIVIDUAL BIRDS, SAMPLES WILL BE ANALYZED FROM A CARNIVORE, THE WESTERN MEADOWLARK, STURNELLA NEGLECTA, AT THE EPA MONTANA COAL-FIRED POWER PLANT PROJECT, COLSTRIP, TO EVALUATE THE SIGNIFICANCE OF HISTOLOGICAL AND GRAVIMETRIC OBSERVATIONS ON ADRENAL GLANDS,

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IMPACT OF OXIDANT AIR POLLUTANTS ON A WESTERN CONIFEROUS
FOREST-ECOSYSTEM
   START/ COMPL DATE :    07/77 - 05/80 : FUNDING : EST. - FY   77  / $  262000
    TASK/EPA CODE :M602A-025    / R805410-01  (GRANT)  PRIOR  FY76 / $ 15000001
   PROJECT OFFICER : R G  WILHOUR
   INVESTIGATORS :    O C TAYLOR                        UNIV. OF CALIFORNIA
                      P R MILLER                        U.S. DEPT. OF AGRICULTURE
                      R J ARKLEY                        UNIV. OF CALIFORNIA
                      F W COBB                          UNIV. OF CALIFORNIA
                      D L DAHLSTEN                      UNIV. OF CALIFORNIA
                      R N KICKERT                       UNIV. OF CALIFORNIA
                      R F LUCK                          UNIV. OF CALIFORNIA
                      J R MCBRIDE                       UNIV. OF CALIFORNIA
                      C P OHMART                        UNIV. OF CALIFORNIA
                      J R PARMETER                      UNIV. OF CALIFORNIA
   MILE: 05/80 -FINAL REPORT
    THE PROPOSED WORK IS THE CONTINUATION OF A STUDY, PREVIOUSLY FUNDED BY EPA
     CONTRACTS, TO DETERMINE THE EFFECT OF LONG TERM EXPOSURE TO OXIDANT AIR
     POLLUTANTS ON A WESTERN CONIFEROUS FOREST ECOSYSTEM AND TO DEVELOP PREDI
    CTIVE MODELS FOR THE SYSTEM. NINETEEN MAJOR PLOTS WERE ESTABLISHED ALONG A
    35 MILE LONG TRANSECT WITH AN OXIDANT POLLUTANT GRADIENT. SEVERAL OTHER
    SMALLER SATELLITE PLOTS HAVE ALSO BEEN ESTABLISHED FOR SPECIAL STUDIES
    AND ONE LARGE PLOT IS USED TO STUDY TREE MORTALITY. A MONITORING N
    ETWORK IS ESTABLISHED TO RECORD CLIMATE AND POLLUTANT CONDITIONS. OTHER SU
    BPROJECTS DESIGNED TO EVALUATE POLLUTANT EFFECTS INCLUDE: TREE GROWTH, RAT
    ING OF VISIBLE POLLUTANT INJURY ON MAJOR TREE SPECIES; POPULATION DYNAMICS
     STUDY WITH BARK BEETLE; MEASURE RATE OF ACCUMULATION AND DECOMPOSITION
     OF LITTER; MEASURE PRECIPITATION, SOIL MOISTURE, AND SOIL TEMPERATURE;
    MEASURE REPRODUCTION (CONE AND SEED PRODUCTION) OF MAJOR PINE SPECIES
     KNOWN TO BE AFFECTED BY THE POLLUTANTS; EVALUATE THE RESPONSE
    OF PATHOGENIC ORGANISMS TO AIR POLLUTANTS; DETERMINE RATE OF NEW SEEDLING
    ESTABLISHMENT AND IDENTIFY ORGANISMS RESPONSIBLE FOR DAMPING-OFF: EVALUATE
     MORTALITY OF TREE SPECIES AND DESCRIBE SUCCESSIONAL PATTERNS. DATA
    COLLECTED WILL BE STORED IN AN ESTABLISHED DATA MANAGEMENT SYSTEM AND WILL
     BE USED IN THE DEVELOPMENT AND TESTING OF PREDICTIVE MODELS.
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805411

II-479

This is a proposal by the Bureau of Business and Economic Research to conduct economic-social-institutional research for EPA under the BACER Program in order to assist the United States to:

a) estimate economic and social consequences of ozone depletion

b) evaluate the benefits and costs of alternative policies for the control of potential anthropogenic reduction of the ozone with special attention to fluorocarbon emissions from the manufacture and use of aerosol sprays, and

c) provide support for the preparation by EPA of reports concerning economic aspects of atmospheric management, and

d) identify gaps and deficiencies, which if corrected would improve the basis for management decisions affecting climate and health.

Phase I will consist of an intensive study of the state-of-the-art to provide the best available information for analysis of alternative policies for limiting damage to the ozone layer and Phase II will identify remedies to reduce uncertainty in decision making.

The research tasks will include assessing available research, updating previous benefit-cost analysis of controlling changes in ozone, comparing the impacts of alternative regulatory instruments, providing an analysis of economic concepts involved, examining intergenerational issues, exploring international implications, evaluating equity and distributional effects and reducing gaps in information needed for decision making.

SULFIDE PRECIPITATION OF HEAVY METALS

START/ COMPL DATE : 09/77 - 11/78 : FUNDING : EST. - FY 77 / $ 93000
TASK/EPA CODE :B610C-567 / S805413-01 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : D WILSON
INVESTIGATORS : A K ROBINSON BOEING COMPANY
C TERHUNE BOEING COMPANY
MILE: 06/77 -FUNDING PACKAGE SUBMITTED
09/77 -AWARD FUNDS FOR PROJECT
09/78 -DRAFT FINAL REPORT
11/78 -FINAL REPORT RECEIVED

OBJECTIVES: TO COMPARE THE SULFIDE AND HYDROXIDE PRECIPITATION PROCESSES FOR THE REMOVAL OF HEAVY METALS, INCLUDING COPPER, CHROMIUM, ZINC, IRON, CADMIUM AND NICKEL, FROM INDUSTRIAL WASTEWATER STREAMS. THE COMPARISON WILL INCLUDE: THE COMPLETENESS OF REMOVAL, THE FULL SCALE INSTALLATION AND OPERATING COSTS, AND A 12-MONTH EXPOSURE STUDY OF THE LEACHING CHARACTERISTICS OF THE SLUDGES, BOTH RAW AND ADMIXED WITH BINDING MATERIALS.

APPROACH: PILOT SCALE PLANTS WILL PROCESS UP TO 190 LITER (50 GALLON) SAMPLES OF WASTEWATERS IN THE SULFIDE, HYDROXIDE, AND COMBINED SULFIDE - HYDROXIDE PROCESSES. SAMPLES OF SLUDGE WILL BE COLLECTED FROM THE PILOT SCALE PLANTS, AND FROM INDUSTRIAL TREATMENT PLANTS USING THE PROCESSES. THE SLUDGE SAMPLES WILL BE EXPOSED IN SMALL ROOF-RACK LYSIMETERS, AND IN 0-76 CUBIC METER (1 CUBIC YEAR) LANDFILL-TYPE LYSIMETERS. HEAVY METAL CONCENTRATIONS WILL BE DETERMINED IN THE PILOT SCALE PLANT STREAMS AND IN THE SLUDGE LEACHATES PRINCIPALLY BY FLAMELESS ATOMIC ABSORPTION SPECTROSCOPY.

II-481

FUNDAMENTAL CONSIDERATIONS IN THE PREPARATION OF REFUSE DERIVED FUELS

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START/ COMPL DATE :    08/77 - 08/79 : FUNDING : EST. - FY   77  / $  130000
 TASK/EPA CODE :C624A-7010    / R805414-01  (GRANT)  PRIOR  FY76 /          1
PROJECT OFFICER : C C  WILES
INVESTIGATORS :    G J TREZEK                           UNIV. OF CALIFORNIA
                   G   SALVAGE                          UNIV. OF CALIFORNIA
MILE: 08/77 -INTERIM REPORT ON PRODUCING D-RDF (BASIC THEORY)
      08/79 -PROJECT COMPLETED
      12/79 -FINAL REPORT PUBLISHED
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THE GRANTEE HAS DEVELOPED FUNDAMENTAL RELATIONSHIPS INVOLVED IN THE SIZE REDUCTION OF MUNICIPAL SOLID WASTE (MSW). ADDITIONAL RESEARCH HAS BEEN CONDUCTED ON FINE GRINDING OF MSW. THE OBJECTIVE OF THIS RESEARCH IS TO EXPLORE AND DEVELOP THE THEORETICAL RELATIONSHIPS INVOLVED IN THE PRODUCTION OF DENSIFIED FORMS OF REFUSE DERIVED FUELS. THE IMPORTANT DEPENDENT AND INDEPENDENT VARIABLES WHICH WILL FULLY CHARACTERIZE D-RDF FORMATION WILL BE INDENTIFIED. EXPERIMENTS WILL THEN BE PERFORMED TO MEASURE THESE VARIABLES. BASIC RELATIONSHIPS WILL THEN BE DEVELOPED TO HELP DESIGN AND PREDICT THE PERFORMANCE OF A RDF DENSIFICATION PROCESS.

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FIELD EVALUATION OF ROCK FILTERS FOR REMOVAL OF ALGAE FROM LAGOON
EFFLUENTS
   START/ COMPL DATE :    07/77 - 06/79 : FUNDING : EST, - FY   77  / $   59950
    TASK/EPA CODE :C611B-7045   / R805416-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R F  LEWIS
   INVESTIGATORS :   K J WILLIAMSON               OREGON STATE HIGHER EDUC. SYS
   MILE: 07/77 -GRANT PACKAGE PROCESSED
         09/77 -GRANT AWARDED TENTATIVE
         03/79 -FIELD WORK COMPLETED
         09/79 -PROJECT CJMPLETION
         03/80 -FINAL REPJRT PUBLISHED
     THIS STUDY INVULVED THE EVALUATION OF THE OPERATIONAL CHARACTERISTICS OF A
      ROCK FILTER FUR REMOVAL OF ALGAE FROM LAGOON EFFLUENTS, AN OPERATING
     FILTER AT VENATA, OREGUN WAS MAINTAINED OVER A 12-MONTH PERIOD: THE
     PARAMETERS MONITORED INCLUDED BOD5, TSS, TVSS, TKN, NH4 PLUS OR MINUS N,
     AND CHLOROPHYLL, FROM THE OPERATING DATA, A COMPUTER MODEL OF THE FILTER
     WAS DEVELOPED AND VERIFIED, THE MODEL WAS USED TO PREDICT THE
     LONG-RANGE OPERATIONAL CHARACTERISTICS AFTER SIGNIFICANT BIOLOGICAL SOLIDS
      HAD COLLECTED.
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805417

II- 483

The Congress will provide a mechanism for bringing together scientists from all over the world to discuss mutual problems concerned with controlling and managing economically important pests. Principles of maintaining or improving our environment while increasing food production will be emphasized. The Congress is being organized by five scientific societies which represent plant pest management (APS, ES, SONY, ACS, WSSA).

805418

II-484

The objective of this study is to quantify the biological and water quality changes of a small stream as it passes through the San Jose, California urban area. The selected stream has no industrial or municipal point discharges and the expected stream quality gradient will be a function only of non-point urban runoff. Detailed field measurements will be periodically conducted over a period of one year both upstream of the urban area and at selected locations within the urban area.

Another task of the project is to measure the storm water pollutant removal effectiveness and water quality changes that occur within an idealized catchbasin.

This project will be conducted in conjuction with a current EPA sponsored demonstration project in San Jose titled "Demonstration of Non-Point Pollutant Abatement thru Improved Street Cleaning Practices".

POLYNUCLEAR AROMATIC COMPOUNDS - SYNTHESIS AND PURIFICATION

START/ COMPL DATE : 05/77 - 05/78 : FUNDING : EST. - FY 77 / $ 40000
TASK/EPA CODE :G712B-BE-04 / R805419-01 (GRANT) PRIOR FY76 / $ 400001
PROJECT OFFICER : J MEEKER
INVESTIGATORS : E J EISENBRAUN OKLA. ST. UNIV.
MILE: 05/78 -DELIVERY OF COMPOUNDS
05/79 -DELIVERY OF COMPOUNDS
05/80 -DELIVERY OF COMPOUNDS

THE SYNTHESIS AND/OR PURIFICATION OF HIGH-PURITY (99.9% GOAL) POLYNUCLEAR AROMATIC COMPOUNDS, CHIEFLY HYDROCARBONS, ARE OF THE TYPES FOUND IN THE PRODUCTS OF INCOMPLETE COMBUSTION (AUTOMOBILE EXHAUST GASES, STACK GASES, COKING OPERATIONS), STILL BOTTOMS, AND HEAVY FUEL OIL FROM SPILLS, AND HENCE APPEAR AS ENVIRONMENTAL POLLUTANTS. IN GENERAL, KNOWN SYNTHESIS ROUTES WILL BE USED, BUT THEIR IMPROVEMENT WILL BE SOUGHT THROUGH USE OF NEW REAGENTS AND TECHNIQUES. HIGH-PRESSURE LIQUID CHROMATOGRAPHY AND/OR ZONE REFINING WILL BE INCLUDED IN THE PURIFICATION PROCEDURES. MODERN ANALYTICAL TECHNIQUES (GLC, LC, TLC, NMR, MASS, AND OTHER SPECTROMETRIC TECHNIQUES WILL BE USED FOR IDENTIFYING COMPOUNDS AND ESTABLISHING THE PURITY OF THE SYNTHESIS PRODUCTS.

II -486

805420

The objectives of this proposal are to develop and apply a method for assessment of effects of prenatal exposure to pesticides, utilizing postnatal examination of variations in skeletal development in the mouse. Changes in frequency of occurrence or severity of more than 80 normally occurring variants will be examined at 60 days postnatal in alizarin-stained skeletons, both in the articulated and disarticulated state, following exposure in utero to the pesticide under investigation. Preliminary studies with the herbicides Trifluralin and 2,4,5-T have been completed and allow detection of exposure to either of these substance based on parameters of number of traits affected, magnitude of response and specifity of response. Studies with Captan and Thalidomide did not result in an ability to detect prenatal exposure.

APPLICATION OF THE NON-POINT SOURCE MODEL TO AN AGRICULTURAL WATERSHED

START/ COMPL DATE : 10/77 - 10/78 : FUNDING : EST. - FY 77 / $ 40000
TASK/EPA CODE :K609A-446 / R805421-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : T O BARNWELL

INVESTIGATORS :	
T H CAHILL	RESOURCE MGT. ASSOCIATES
T R HAMMER	RESOURCE MGT. ASSOCIATES
R W PIERSON	RESOURCE MGT. ASSOCIATES
B COHEN	RESOURCE MGT. ASSOCIATES
N B BLISS	RESOURCE MGT. ASSOCIATES
P IMPERATO	RESOURCE MGT. ASSOCIATES

MILE: 10/77 -START OF GRANT
10/78 -FINAL REPORT

THE NON-POINT SOURCE (NPS) POLLUTION LOADING MODEL HAS BEEN DEVELOPED BY EPA (EPA-600/3-76-083, 1976) AS A WATER QUALITY TOOL. THE USEFULNESS OF THE MODEL TO MANAGEMENT AGENCIES MUST BE PROVEN BY APPLICATION OF VARIOUS PHYSIOGRAPHIC REGIONS AND IN LARGE WATERSHEDS. THE OBJECTIVE OF THIS RESEARCH IS TO APPLY THE NPS MODEL TO A TRIBUTARY SUB-BASIN OF THE SANDUSKY RIVER IN THE TILL PLAIN AREA OF NORTHERN OHIO. EIGHTY PERCENT OF THIS HONEY CREEK WATERSHED (DRAINAGE AREA OF 187 SQUARE MILES) IS DEVOTED TO ROW AND FIELD CROPS. A COMPUTERIZED LAND RESOURCE INFORMATION SYSTEM HAS BEEN DEVELOPED AND WATER CHEMISTRY MONITORED EXTENSIVELY DURING THE PAST YEAR, FACILITATING CALIBRATION. THE NPS MODEL WILL BE EVALUATED FOR ITS CAPACITY TO PREDICT NUTRIENT, PESTICIDE, AND SEDIMENT TRANSPORT FROM THE WATERSHED IN TERMS OF EXISTING FARM PRACTICES AND ALTERNATIVE LAND MANAGEMENT OPPORTUNITIES. A REPORT DESCRIBING THE RESULTS OF THE RESEARCH WILL BE PREPARED.

805422

II-488

Partial support is requested for the Satellite A of the Statistical Ecology Program of the Second International Ecological Congress. An international group of scientists from various disciplines relating to ecological abundance, diversity, and biomonitoring and assessment of environment will convene for research discussion and collaboration on the quantification and application of ecological concepts.

Modeling has had a strong influence on the development of ecological concepts; statistics has played a major role in ecological applications and management. This program will bring together these parallel lines of development, with the aim of better identification of, and solution of, quantifiable problems in ecology.

Emphasis in the Satellite A portion will be on abundance and diversity: how can mathematical and statistical methods be used to improve the measurement of abundances and diversities, hence improve the empirical foundations of the concepts surrounding these notions? Conversely, how can the concepts better guide the choice and utilizatio of mathematical formalism to meet the needs of contemporary environmental problems?

One hundred research participants are expected.

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PLANS FOR INVESTIGATION OF NONSTEADY STATE PHENOMENA OF STREAM
SEDIMENTATION & EFFECTS ON STREAM COMMUNITIES & SALMONID POPU
   START/ COMPL DATE :    10/77 - 10/78 : FUNDING : EST. - FY   77  / $   45000
    TASK/EPA CODE :M608A-026    / R805423-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : M A  SHIRAZI
   INVESTIGATORS :    C E WARREN                            OREGON STATE HIGHER EDUC. SYS
                      W K SEIM                              OREGON STATE HIGHER EDUC. SYS
   MILF: 10/78 -FINAL REPORT
     THE GENERAL OBJECTIVE OF THIS PROJECT IS TO DEVELOP A COMPREHENSIVE RESE
     ARCH PLAN FOR INVESTIGATION OF NONSTEADY STATE PHENOMENA OF STREAM SEDIMEN
     TATION AND ITS EFFECTS ON BIOLOGICAL COMMUNITIES AND SALMONID POPULATIONS.
      THE RESEARCH PLANNED WILL BE INTENDED TO PROVIDE THE UNDERSTANDING NECES
     SARY TO SPECIFY WATERSHED MANAGEMENT PRACTICES THAT WOULD MINIMIZE HARMFUL
      EFFECTS OF STREAM SEDIMENTATION. INVESTIGATIONS TO BE PLANNED
      WILL INCLUDE LABORATORY STREAM, EXPERIMENTAL STREAM CHANNEL, AND FI
     ELD STUDY APPROACHES. EXTANT THEORY AND MODELS WILL BE TAKEN INTO ACCOUNT,
     AND CONSIDERATION WILL BE GIVEN TO MATTERS OF WATERSHED AND STREAM
     CLASSIFICATION. A PRELIMINARY RATIONALE FOR INTEGRATION, GENERALI
     ZATION, AND APPLICATION OF RESULTS OF PLANNED INVESTIGATIONS WILL BE DEVEL
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II-490

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RELATIONSHIP BETWEEN BLACK MANGROVE FOREST AND ESTUARINE WATERS

   START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST. - FY   77  / $   35000
    TASK/EPA CODE :M608C-027     / R805424-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : H V  KIBBY
   INVESTIGATORS :   A   LUGO                         STATE UNIVERSITY OF FLA. SYS.
   MILE: 07/78 -FINAL REPORT
     EXPORTS AND IMPORTS OF DISSOLVED AND PARTICULATE ORGANIC MATTER WILL BE
     MEASURED FROM ELECTED BLACK MANGROVE FORESTS IN THE WEST COAST OF FLORIDA.
     RESULTS SHOUL SHOW NET EXPORTS OF ORGANIC MATTER FROM BLACK MANGROVES
     TO ESTUARINE WATERS. THEY SHOULD ALSO SHOW THAT BLACK MANGROVE STANDS THAT
      ARE APPARENTLY ISOLATED FROM THE SEA DO HAVE PERIODIC EXCHANGES WITH THE
     SEA AND THAT THESE EXCHANGES ARE IMPORTANT TO THE MAINTENANCE OF
     REGIONAL PRODUCTIVITY.
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-II-491

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RELATIONSHIP BETWEEN BLACK MANGROVE FOREST AND ESTUARINE WATERS

   START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST. - FY   77  / $   35000
    TASK/EPA CODE :M644A-027     / R805424-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : H V  KIBBY
   INVESTIGATORS :   A E LUGO                        STATE UNIVERSITY OF FLA. SYS.
   MILE: 07/78 -FINAL REPORT
     TIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OT
     HERS. EXPORTS AND IMPORTS OF DISSOLVED AND PARTICULATE ORGANIC MATTER WILL
     BE MEASURED FROM SELECTED BLACK MANGROVE FORESTS IN THE WEST COAST OF F
     LORIDA. RESULTS SHOULD SHOW NET EXPORTS OF ORGANIC MATTER FROM BLACK MANGR
     OVES TO ESTUARINE WATERS. THEY SHOULD ALSO SHOW THAT BLACK MANGROVE STANDS
      THAT ARE APPARENTLY ISOLATED FROM THE SEA DO HAVE PERIODIC EXCHANGES
     WITH THE SEA AND THAT THESE EXCHANGES ARE IMPORTANT TO THE MAINTENANCE OF
     REGIONAL PRUDUCTIVITY.
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FEASIBILITY OF USING CHLORINE DIOXIDE IN THE DISINFECTION OF MUNICIPAL WASTEWATER EFFLUENTS

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   START/ COMPL DATE :    09/77 - 09/79 : FUNDING : EST. - FY   77  / $   69030
    TASK/EPA CODE :C611B-7057   / R805426-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : M C  MECKES
   INVESTIGATORS :    P V ROBERTS                  STANFORD UNIVERSITY
                      P L MCCARTY                  STANFORD UNIVERSITY
                      M   REINHARD                 STANFORD UNIVERSITY
   MILE: 07/77 -PACKAGE PREPARED
         09/77 -PROJECT START
         06/79 -PROJECT COMPLETED
         09/79 - FINAL REPORT
         03/80 -FINAL REPORT AVAILABILITY
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CHLORINE DIOXIDE WILL BE EVALUATED AS AN ALTERNATIVE TO CHLORINE FOR THE DISINFECTION OF WASTEWATER. PRINCIPAL CRITERIA ARE: (A) EFFECTIVENESS IN KILLING FECAL COLIFORM BACTERIA, AND (B) COST OF GENERATION AND APPLICATION. THE DOSE-KILL RELATIONSHIP WILL BE INVESTIGATED IN LABORATORY-SCALE DISINFECTION EXPERIMENTS, IN WHICH THE EFFECTS OF DOSE TIME, PH AND TEMPERATURE KILL WILL BE STUDIED. BASED ON THESE EXPERIMENTS AND A SURVEY OF THE SCIENTIFIC LITERATURE, USERS' EXPERIENCE, AND COMMERCIALLY AVAILABLE GENERATION TECHNOLOGY, A CONCEPT FOR DISINFECTION FACILITIES WILL BE DEVELOPED AND TESTED AT PILOT SCALE. PRELIMINARY DESIGN AND COST ESTIMATION OF FACILITIES IN THE RANGE OF 1 MGD TO 100 MGD WILL PROVIDE THE BASIS OF AN EVALUATION OF ECONOMIC FEASIBILITY. THE COMPARATIVE EFFECTIVENESS OF CHLORINE AND CHLORINE DIOXIDE IN KILLING COLIFORMS AND VIRUS WILL BE DETERMINED IN A LIMITED NUMBER OF PARALLEL EXPERIMENTS, AS WILL THE FORMATION OF VOLATILE, CHLORINATED ORGANIC SUBSTANCES.

The research work conducted under this project will be dedicated to the development of a reliable, convenient and universally applicable method for the determination of total carbon in atmospheric particulate samples. It is also expected that a qualitative description of the majority of organic species present in atmospheric particulate matter be achieved. This will provide, most immediately, a sound basis for the development of the total carbon method. It will also provide essential information needed to develop other analytical methods as well as in the fundamental understanding of atmospheric chemistry. The work described and the results expected will provide a direct and significant benefit to the development of more effective atmospheric pollution control strategies.

It is planned to attack the proposed research in the following fashion: (1) investigate the use of selective solvent extraction coupled with high performance liquid chromatography and total carbon measurement instrumentation in separating the organic carbon compound fractions of atmospheric samples into classes and subsequently into individual species, and (2) develop and evaluate sensitive instrumental methods of organic carbon measurements for bulk and size separated samples collected on glass and teflon substrates. These techniques will include oxidation by combustion, atomic oxygen and wet chemical procedures (using both extracted and unextracted samples) with subsequent CO_2 detection.

805428

This research effort is to help evaluate the human health risk of prolonged exposures to mineral fibers. The project will employ four different research methodologies to obtain information on the carcinogenicity of mineral fibers as found in the Duluth, Minnesota water supply prior to mineral fiber removal.

Two major classes of investigation will be undertaken:

1. A retrospective epidemiological evaluation of the incidence of cancers from all sites occurring within the target population.

    a. comparative analysis of age and sex

    b. a case-by-case review of all cancers found within the population and evaluation of cancers by site relative to morbidity rates from the Third Naitonal Cancer Survey and the SEEK program of the N.C.I.

These comparisons will be analyzed with consideration given to the environmental monitoring data compiled from the fourth part of the project (Environmental Surveillance.)

2. The second overall method of risk assessment will be an in-vitro study employing the so-called Ames screening method for determination of carcinogenicity followed up by use of mammalian cell cultures in an attempt to develop a dose-response relationship between the level of mineral fibers and degree of mutagenicity.

805429

II ·495

To improve corn soil insect population assessment and damage prediction capabilities, and develop soil insect pest management strategies for implementation.

RESTORATION OF MOSES LAKE BY DILUTION

START/ COMPL DATE : 08/77 - 07/80 : FUNDING : EST. - FY 77 / $ 110000
TASK/EPA CODE :M412A-28 / R805430-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : K W MALUEG
INVESTIGATORS : F B WELCH UNIV. OF WASHINGTON
MILE: 07/80 -FINAL REPORT

THE RESTORATION OF MOSES LAKE IN EASTERN WASHINGTON STATE HAS BEEN PLANNED IN THREE PHASES. THE PRINCIPAL RESTORATIVE TECHNIQUE IS THE REDUCTION OF PHOSPHORUS CONCENTRATION BY DILUTION WITH COLUMBIA RIVER WATER THAT IS LOW IN P (ABOUT 25 MICRON G/1). THE THREE PHASES ESSENTIALLY INVOLVE THREE DIFFERENT SECTIONS OF THE LAKE. THE PURPOSE OF THIS PROJECT IS TO EVALUATE THE EFFECTIVENESS OF DILUTION WATER ADDITION AS A RESTORATIVE TECHNIQUE IN MOSES LAKE AND TO DETERMINE THE OPTIMUM QUANTITY AND TIMING OF THE ADDITION THAT WILL PROVIDE THE MAXIMUM BENEFIT IN TERMS OF REDUCED ALGAL BIOMASS. THE APPROACH IS TO COMPREHENSIVELY DETERMINE NUTRIENT, ALGAL AND CONSERVATIVE PROPERTIES AT SEVERAL SECTIONS OF THE LAKE DURING THREE SUMMER PERIODS WHEN DILUTION WATER IS BEING ADDED TO THE LAKE BY COMPARING OBSERVED WITH EXPECTED AVERAGE CONCENTRATIONS IN THE VARIOUS SECTIONS, THE RELATIVE COMBINED IMPACT OF SUCH NEGATIVE FACTORS AS P RESUSPENSION FROM SEDIMENTS, RELEASE FROM CARP AND UPLAKE RETURN BY WIND CAN BE EVALUATED. EXPECTED CONCENTRATIONS CAN BE ESTIMATED BY A SIMPLE CONTINUITY EQUATION AND PREVIOUS RESULTS FROM A PHYSICAL MODEL. AN AVERAGE CONCENTRATION BETWEEN 50 AND 60 MICRON G/1 P WAS EXPECTED IN THE LAKE SECTION TREATED DURING PHASE ONE. THAT IS COMPARED TO THE NORMAL LEVEL OF ABOUT 180 MICRON G/L. A REDUCTION OF 80 PERCENT IN ALGAL BIOMASS WAS ALSO EXPECTED. THESE CHANGES SHOULD RESULT FROM AN ADDITION OF 1000 CFS OF DILUTION WATER FOR TWO TEN-DAY PERIODS INTERSPERSED WITH TWO 30-DAY, NON-DILUTION PERIODS. ACTUAL TEST CONDITIONS WILL DEPEND TO A LARGE EXTENT ON WATER AVAILABILITY.

II-497

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BIOSYNTHESIS OF N-NITROSO COMPOUNDS FROM TRACE LEVEL PRECURSORS

    START/ COMPL DATE :    09/77 - 12/79 : FUNDING : EST. - FY   77  / $   35600
     TASK/EPA CODE :J601F-05      / R805431-01  (GRANT)  PRIOR  FY   / $   644001
    PROJECT OFFICER : J    SANTOLUCITO
    INVESTIGATORS :    S S EPSTEIN                      UNIV. OF ILLINOIS
                       Z M IQBAL                        UNIV. OF ILLINOIS
    MILE: 09/78 -REPORT ON ANALYTICAL METHOD FOR DETECTION OF NITROSAMINES
          09/79 -REPORT ON BIOSYNTHESIS OF DIMETHYL NITROSAMINE IN THE MOUSE
          12/79 -REPORT ON A STRATEGY FOR CARCINOGEN PRECURSOR EXPOSURE MONIT
      OBJECTIVE: TO STUDY THE IN VIVO BIOSYNTHESIS OF N-NITROSO COMPOUNDS FROM
      TRACE LEVEL PRECURSORS UNDER CONDITIONS REFLECTING ENVIRONMENTAL
      EXPOSURE. APPROACH: THESE STUDIES ARE BASED ON THE QUANTITATIVE IDENTIF
      ICATION OF THE BIOSYNTHESIZED N-NITROSO COMPOUNDS USING THE THERMAL ENERGY
       ANALYZER TECHNIQUES WHICH ARE SENSITIVE TO PPT. LEVELS. INCLUDED ARE
      TIME- AND DOSE-DEPENDENCE OF DIMETHYL NITROSAMINE FOLLOWING ADMINISTRAT
      ION OF NITRITE AND DIMETHYLAMINE AND ZIRAM, RESPECTIVELY, AND BIOSYNTHESIS
      OF DI-N-PROPYLNITROSAMINE, N-NITROSOCARBARYL AND N-NITROSOATRAZINE
      FOLLOWING GAVAGE WITH NITRITE AND TREFLAN, CARBARYL AND ATRAZINE R
      ESPECTIVELY. STUDIES ALSO INCLUDED TO INVESTIGATE BIOSYNTHESIS FOLLOWING I
      NHALATION EXPOSURE OF MICE TO NOX AND GASEOUS AMINES; MODIFYING EFFECTS OF
      CATALYSTS AND INHIBITORS ON KINETICS OF BIOSYNTHESIS. OUTPUT: ANNUAL
      PROGRESS REPORTS ON KINETICS OF BIOSYNTHESIS.
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II-498

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FLUVIAL TRANSPORT OF SEDIMENTS AND NUTRIENTS FROM NONPOINT SOURCES

   START/ COMPL DATE :    10/77 - 10/78 : FUNDING : EST. - FY   77  / $   88034
    TASK/EPA CODE :K609A-445    / R805436     (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : T O  BARNWELL
   INVESTIGATORS :    D B BAKER
                      F H VERHOFF                      HEIDELBERG COLLEGE
   MILE: 10/77 -START OF GRANT                         WEST VA. UNIVERSITY
         10/78 -FINAL REPORT
    THE OBJECTIVES OF THIS STUDY ARE TO INVESTIGATE THE TRANSPORT AND
    PROCESSING OF NUTRIENTS AND SEDIMENTS AS THEY MOVE THROUGH THE DRAINAGE NE
    TWORK OF A LARGE AGRICULTURAL RIVER BASIN. THE STUDY WILL UTILIZE A "NESTE
    D" SET OF NINE STREAM GAGING/SAMPLING STATIONS IN THE SANDUSKY RIVER BASIN
     IN OHIO. DETAILED HYDROGRAPHS, SEDIMENT GRAPHS AND CHEMOGRAPHS WILL BE
    OBTAINED FOR ALL STORM EVENTS DURING THE STUDY PERIOD. MASS BALANCE COM
    PUTATIONS WILL BE MADE FOR WATER, SEDIMENT AND NUTRIENTS AS THEY MOVE THRO
    UGH THE NETWORK. THE WAVE FRONT MOVEMENT OF THE HYDROGRAPH WILL BE USED TO
     SEPARATE SEDIMENT FROM SHEET EROSION FROM RESUSPENDED SEDIMENT. N
    UTRIENT MASS BALANCES WILL BE USED TO STUDY PROCESSING AND DELIVERY RATIOS
     ALONG THE RIVER. DELIVERY OF PHOSPHORUS FROM INLAND POINT SOURCES TO
    LAKE ERIE WILL ALSO BE STUDIED AS WELL AS THE EXTENT OF ANNUAL VARIABILITY
    IN NUTRIENT AND SEDIMENT YIELDS FROM AGRICULTURAL WATERSHEDS. INDIVIDUAL
    WATERSHED YIELD WILL BE CORRELATED WITH DETAILED LAND USE/LAND C
    APABILITY DATA. A FINAL REPORT WILL BE PREPARED AT THE END OF THE PROJECT.
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PRODUCTION IN COASTAL SALT MARSHES OF SOUTHERN CALIFORNIA

START/ COMPL DATE : 09/77 - 08/79 : FUNDING : EST. - FY 77 / $ 24973
TASK/EPA CODE :M608C-029 / R805438-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : H V KIBBY
INVESTIGATORS : H P EILERS CALIF. STATE UNIV. & COLLEGES
MILE: 08/79 -FINAL REPORT

THE OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE ANNUAL NET AERIAL PRODUCTION IN SOUTHERN CALIFORNIA COASTAL SALT MARSHES, TO DETERMINE PRODUCTIVE RESPONSE TO ENVIRONMENTAL FACTORS, AND TO ESTIMATE MARSH CONTRIBUTION TO SECONDARY PRODUCTION IN THE COASTAL SYSTEM. SIX STUDY MARSHES WILL BE SELECTED TO REPRESENT THE VARIETY AND LATITUDINAL EXTENT OF THE SOUTHERN CALIFORNIA COAST. THREE WILL BE CHOSEN FROM THOSE WITH CONTINUOUS OCEAN CONTACT, TWO FROM THOSE WITH SEASONAL CONTACT, AND ONE FROM DIKED MARSH. SAMPLING TO DETERMINE PRODUCTION IN EACH STUDY MARSH WILL BE BY THE HARVEST METHOD WITH SAMPLES COLLECTED AT MONTHLY INTERVALS FOR ONE YEAR. ENVIRONMENTAL MEASUREMENTS WILL INCLUDE TIDAL ELEVATION, INUNDATION FREQUENCY AND DURATION, SOIL SALINITY, SOIL NITROGEN, SOIL AERATION (REDOX), AND SOIL TEMPERATURE. MARSH EXPORT OF ORGANIC DETRITUS WILL BE ESTIMATED BY ANALYZING CREEK WATER SAMPLES FROM EBB AND FLOOD FLOW FOR SUSPENDED ORGANIC PARTICULATES.

II-500

PRODUCTION IN COASTAL SALT MARSHES OF SOUTHERN CALIFORNIA

START/ COMPL DATE : 09/77 - 08/79 : FUNDING : EST, - FY 77 / $ 15000
TASK/EPA CODE :M644A-100 / R805438-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : H V KIBBY
INVESTIGATORS : H P EILERS
MILE: 08/79 -FINAL REPORT CALIF, STATE UNIV, & COLLEGES

THIS IS ON OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO OTHERS. THE OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE ANNUAL NET AERIAL PRODUCTION IN SOUTHERN CALIFORNIA COASTAL SALT MARSHES, TO DETERMINE PRODUCTIVE RESPONSE TO ENVIRONMENTAL FACTORS, AND TO ESTIMATE MARSH CONTRIBUTION TO SECONDARY PRODUCTION IN THE COASTAL SYSTEM, SIX STUDY MARSHES WILL BE SELECTED TO REPRESENT THE VARIETY AND LATITUDINAL EXTENT OF THE SOUTHERN CALIFORNIA COAST, THREE WILL BE CHOSEN FROM THOSE WITH CONTINUOUS OCEAN CONTACT, TWO FROM THOSE WITH SEASONAL CONTACT, AND ONE FROM DIKED MARSH, SAMPLING TO DETERMINE PRODUCTION IN EACH STUDY MARSH WILL BE BY THE HARVEST METHOD WITH SAMPLES COLLECTED AT MONTHLY INTERVALS FOR ONE YEAR, ENVIRONMENTAL MEASUREMENTS WILL INCLUDE TIDAL ELEVATION, INUNDATION FREQUENCY AND DURATION, SOIL SALINITY, SOIL NITROGEN, SOIL AERATION (REDOX), AND SOIL TEMPERATURE, MARSH EXPORT OF ORGANIC DETRITUS WILL BE ESTIMATED BY ANALYZING CREEK WATER SAMPLES FROM EBB AND FLOOD FLOW FOR SUSPENDED ORGANIC PARTICULATES,

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EFFECTS OF DRILLING FLUIDS AND OIL IN CORALS OCCUPYING HARD-BANK
COMMUNITIES
   START/ COMPL DATE :    07/77 - 11/77 : FUNDING : EST. - FY   77  / $   22561
    TASK/EPA CODE :0625F-1-05   / R805441-01  (GRANT)  PRIOR  FY   /           1
   PROJECT OFFICER : N L  RICHARDS
   INVESTIGATORS :   T J BRIGHT                      TEXAS A & M UNIVERSITY SYSTEM
                     J H THOMPSON                    TEXAS A & M UNIVERSITY SYSTEM
   MILE: 07/77 -BEGIN FIELD COLLECTION OF CORALS FOR STUDY
        06/78 -REPORT ON EFFECTS OF DRILLING FLUIDS ON CORALS
     AN EXPERIMENTAL DESIGN IS PROPOSED IN WHICH THE BEHAVIORAL AND
     PHYSIOLOGICAL REACTIONS OF SCLERACTINIAN CORALS INDIGENOUS TO HARD BANK
     COMMUNITIES IN THE GULF OF MEXICO ARE DETERMINED IN RESPONSE TO CHRONIC
     LOW LEVELS OF DRILLING FLUID COMPONENTS AND SHALE OIL PRODUCTS. THE DESIGN
      INCORPORATES TIME-LAPSE-MACROPHOTOGRAPHIC AND RESPIROMETRIC TEC
     HNIQUES TO MEASURE THE RESPONSE PARAMETERS. THE CORALS SHALL BE EXPOSED TO
     THE CONTAMINANTS IN "FLOW THROUGH" AQUARIA ON BOARD A PLATFORM TWELVE M
     ILES OFFSHORE OF PANAMA CITY. CONTROLS SHALL INCLUDE PARALLEL OBSERVATIONS
      OF CORALS EXPOSED TO UNCONTAMINATED SEA WATER IN IDENTICAL "FLOW
     THROUGH" AQUARIA, AND OF CORALS TRANSPLANTED TO THE SITE OF THE
     PLATFORM AT A DEPTH SIMILAR TO THAT FROM WHICH THEY WERE COLLECTED.
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FEASIBILITY STUDY OF GRANULAR ACTIVATED CARBON ABSORPTION AND ON-SITE
REGENERATION
   START/ COMPL DATE :    08/77 - 05/80 : FUNDING : EST. - FY   77  / $  459000
    TASK/EPA CODE :C614A-7169   / R805443-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : J    DEMARCO
   INVESTIGATORS :    A A ROSEN                           CINCINNATI WATER WORKS
                      R   MILLER                          CINCINNATI WATER WORKS
                      C   COLE                            CINCINNATI WATER WORKS
                      E   KISPERT                         CINCINNATI WATER WORKS
   MILE: 02/79 -INTERIM REPORT ESTIMATE
         05/80 -FINAL REPORT
    TO DETERMINE THE FEASIBILITY OF GRANULAR ACTIVATED CARBON ADSORPTION,
    UTILIZING EITHER DEEP BED CONTACTORS OR CONVENTIONAL DEPTH GRAVITY FI
    LTERS WITH ON-SITE CARBON REGENERATION, FOR REMOVING SPECIFIC TRACE ORGANI
    CS FROM OHIO RIVER WATER WHILE TREATING IT FOR HUMAN CONSUMPTION. SIX EXIS
    TING RAPID SAND FILTERS OF THE CINCINNATI WATER WORKS TREATMENT PLANT WILL
     BE CONVERTED TO GRANULAR ACTIVATED CARBON BEDS. ORGANIC ADSORPTION
    FOR THREE CARBON MEDIA DEPTHS WILL BE STUDIED. CARBON CONTACTORS WILL
    BE INSTALLED TO RECEIVE THE EFFLUENT FROM ONE EXISTING RAPID SAND FILTER
    AND WILL BE OPERATED INDEPENDENTLY OF THE CARBON FILTERS. ORGANIC ADS
    ORPTION WILL BE STUDIED. AN ACTIVATED CARBON REGENERATION UNIT WILL BE PRO
    VIDED TO REGENERATE THE GRANULAR CARBON ON SITE. EFFICIENCY OF REGENERATED
    CARBON WILL BE STUDIED. TWO CARBON FILTERS OF EACH CARBON MEDIA DEPTH WILL
    BE PROVIDED SO THAT AT LEAST ONE OF EACH PAIR WILL BE FILTERING AT ALL
    TIMES WHILE THE OTHER MAY BE OUT OF SERVICE FOR MEDIA REPLACEMENT. ONE
    OF THE CARBON CONTACTORS WILL SERVE AS A STANDBY UNIT TO ALLOW CARBON RE
    GENERATION WITHOUT PLANT SHUTDOWN. CARBON WILL BE REMOVED, REGENERATED AND
     RETURNED AS EFFICIENTLY AS POSSIBLE. THIS WILL ESTABLISH THE OPTIMUM
    COST OF USING ON-SITE REGENERATED CARBON.
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805446

Objectives. To discover why pricing and other incentive schemes for environmental protection, so often proposed by economists, are seldom attractive to legislators, administrators, interest groups and the public. To identify the detailed characteristics of environmental problems that might actually be better handled by such schemes and the critical characteristics of those that are not best handled that way, or not enough better to matter. To synthesize a critical appraisal and guidelines for choosing among alternative systems of environmental management

Approach. Case studies of several environmental problems or sets of problems in sufficient detail to evaluate the relevance of pricing mechanisms. Field work, mostly interviews, to discover the nature of objections to pricing mechanisms and the bases for objections. Examination of the incentives that are the unintended consequence of regulatory mechanisms that are not explicitly oriented toward incentives.

Current plans. To integrate all elements of the study through a regularly meeting seminar that will include all the investigators under this project and others, including students, whose current interests and activities are relevant to this study.

II-504

IMPROVEMENT AND EVALUATION OF METHODS FOR SULFATE ANALYSIS

START/ COMPL DATE : 10/77 - 00/00 : FUNDING : EST. - FY 77 / $ 69300
TASK/EPA CODE :E621A-14 / R805447-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : J C PUZAK
INVESTIGATORS : J J WESOLOWSKI STATE DEPT. OF HEALTH
B R APPEL STATE DEPT. OF HEALTH
E L KOTHNY STATE DEPT. OF HEALTH
E M HOFFER STATE DEPT. OF HEALTH
MILE: 10/78 -COMPLETE EVALUATION OF SULFATE METHODS
10/79 -COMPLETE EVALUATION OF H2SO4 METHOD

THE OBJECTIVES OF THIS WORK INCLUDE: 1) OPTIMIZING A SIMPLE ANALYTICAL PROCEDURE FOR SULFATE DETERMINATION AND EVALUATING IT FOR RUGGEDNESS; 2) EVALUATING A SERIES OF SULFATE METHODS; AND 3) EVALUATING TWO TECHNIQUES FOR EXTRACTING SULFATE FROM ATMOSPHERIC SAMPLES. METHODS EVALUATION WILL INVOLVE DETERMINING THE PRACTICAL WORKING RANGE, PRECISION, ACCURACY, COMPARABILITY BETWEEN METHODS AND THE INFLUENCE OF POTENTIAL INTERFERENTS. FOR THIS STUDY, THE PRACTICAL WORKING RANGE OF THE METHODS WILL BE DEFINED AS THE CONCENTRATION RANGE OF ANALYTE YIELDING CONSTANT VARIANCE AND ACCURACY. THE BARIUM SULFATE TURBIDIMETRIC PROCEDURE IS THE METHOD TO BE OPTIMIZED. THE SULFATE METHODS TO BE EVALUATED ARE THE OPTIMIZED TURBIDIMETRIC METHOD, THE COLOVOS AND MIDWEST RESEARCH VERSIONS OF THE AUTOMATED METHYLTHYMOL BLUE METHOD AND THE DIONEX ION CHROMATOGRAPH METHOD.

II-505

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EFFICIENT ALGORITHMS FOR SOLVING SYSTEMS OF ORDINARY DIFFERENTIAL
EQUATIONS APPLICABLE TO BASIN ECOSYSTEM MODELING
   START/ COMPL DATE :    07/77 - 08/78 : FUNDING : EST. - FY   77  / $   37995
    TASK/EPA CODE :K6178-365    / R805452-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R R  LASSITER
   INVESTIGATORS :   H   BOUVER                       STATE UNIVERSITY OF NEW YORK
   MILE: 08/78 -USER MANUAL FOR BEST NUMERICAL INTEGRATION SCHEME
     EFFICIENT COMPUTER ALGORITHMS FOR INTEGRATION OF 3YSTEMS OF GENERAL DIF
     FERENTIAL EQUATIONS WILL BE COMBINED INTO A PACKAGE TO PERMIT SUBJECT AREA
     USERS TO MODEL ENVIRONMENTAL SYSTEMS EASILY AND WITH THE OPTION TO
     RESTRICT STATE VARIABLES TO NON-NEGATIVE VALUES.
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805453

The primary objective is to determine the effectiveness of a polyculture of fishes to reduce nutrients and algae in wastewater. The key species to be used are *Hypopthalmichthyes molitrix* and *Aristichthyes nobilis*, both are filter feeders. This will be accomplished by stocking the fish at various rates into a six pond series of sewage oxidation lagoons at the State Hospital at Benton, Arkansas. Parameters to be monitored at the outflow of each pond are: dissolved oxygen, biochemical oxygen demand, pH, carbon dioxide, turbidit conductivity, fecal coliform, suspended solids, nutrients, temperature, flow rate, and plankton populations. Methods of harvesting fish from sewage lagoons will also be investigated.

Preliminary studies in sewage lagoons and aquaculture ponds have shown that the presence of these fishes does cause a reduction of nutrients and a significant impact on plankton populations. The purpose of this investigation is to determine proper stocking rates and BOD loading rates for lagoons to affect maximum treatment of the effluent.

805454

II-507

Water quality restoration of three eutrophic lakes (Annabessacook Lake, Cobbossee Lake, and Pleasant Pond) by nutrient inactivation in bottom sediments with aluminum, and by nonpoint source control of agricultural wastes by construction of manure storage facilities.

II-508

805455

Musk thistle (Carduus nutans) is a serious pest of crop, range and pastureland in the United States. A cooperative effort among the disciplines of botany, entomology, and remote sensing is proposed to increase the effectiveness of control procedures and thereby reduce pesticide use. Such studies will determine the factors which contribute to the successful spread of musk thistle and develop optimal strategies for detection and control. The resulting data will be used to develop a conceptual framework for general control strategies.

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EFFECT OF LIMING, PHOSPHATE, AND ORGANIC MATTER ON HEAVY METAL
AVAILABILITY TO PLANTS GROWN IN SLUDGE-AMENDED SOILS
   START/ COMPL DATE :    09/77 - 09/80 : FUNDING : EST. - FY   77  / $   39345
    TASK/EPA CODE :U6228-05      / R805456-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : J H  RYAN
   INVESTIGATORS :   J W SHUFORD                      ALABAMA AGRIC. & MECH. UNIV.
                     L M MUGWIRA                      ALABAMA AGRIC. & MECH. UNIV.
   MILE: 08/78 -EVALUATION OF LIMING TREATMENTS ON HEAVY METAL UPTAKE
         08/79 -DETERMINE THE EFFECT OF PHOSPHATE TREATMENT ON METAL UPTAKE
    THE PRIMARY OBJECTIVE OF THIS STUDY IS TO DETERMINE THE TREATMENTS BEST
    SUITED FOR AGRICULTURAL APPLICATIONS OF SEWAGE SLUDGE CONTAINING
    RELATIVELY HIGH HEAVY METAL CONCENTRATIONS. A POSSIBLE MECHANISM FOR MAN
    AGING THE UPTAKE BY AND TOXICITY OF THE METALS TO PLANTS IS THE CONTROL OF
    SOIL PH BY PHOSPHATE AND LIME TREATMENT. ORGANIC CHELATE BINDING OF THE ME
    TALS MAY ALSO BE INFLUENCED BY THE PH OF THE SOIL. DEVELOPMENT OF A LIMING
     AND PHOSPHATE MANAGEMENT PROCESS FOR INCREASED SLUDGE APPLICATION TO A
    GRICULTURAL LAND WUULD PROVIDE A PARTIAL SOLUTION TO THE PROBLEM OF SEWAGE
     DISPOSAL.
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THE EFFECTIVENESS OF VEGETATION BUFFER STRIPS FOR CONTROLLING SEDIMENT
AND OTHER WATER POLLUTANTS FROM DISTURBED WATERSHEDS

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   START/ COMPL DATE :    09/77 - 09/80 : FUNDING : EST. - FY   77  / $  183000
    TASK/EPA CODE :K617B-427     / R805457-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : L A  MULKEY
   INVESTIGATORS :    D B SIMONS                          COLORADO STATE UNIVERSITY
                      R M LI                              COLORADO STATE UNIVERSITY
   MILE: 09/77 -START PROJECT
         09/78 -REPORT ON EFFECTIVENESS OF BUFFER STRIPS FOR SEDIMENT CONTROL
         09/80 -DESIGN CRITERIA FOR STREAM-SIDE MANAGEMENT ZONES
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THE PRIMARY OBJECTIVE OF THIS STUDY IS TO DEVELOP A METHODOLOGY FOR EVALUATING THE EFFECTIVENESS OF VEGETATION BUFFER STRIPS FOR CONTROLLING SEDIMENT AND OTHER MAJOR WATER POLLUTANTS SUCH AS NITROGEN AND PHOSPHORUS. THIS METHODOLOGY WILL BE DEVELOPED CONSIDERING THE PHYSICAL SIGNIFICANCE OF THE GOVERNING PROCESSES WHICH DOMINATE THE HYDROLOGIC, HYDRAULIC, AND VEGETATIVE ASPECTS OF THE BUFFER ZONE. THE DESIGN OF THE BUFFER STRIP WILL DETERMINE SIZE OF ZONE, SHAPE OF ZONE, AND TYPE OF VEGETATION IN THE BUFFER STRIP. THIS DETERMINATION WOULD BE INDEPENDENT OF THE LAND USE IN OTHER PARTS OF THE WATERSHED. THE HYDROLOGIC ANALYSIS WILL CONSIDER TYPE, DURATION, INTENSITY AND RECURRENCE INTERVAL OF STORMS, INFILTRATION RATE, WATER, SEDIMENT RUNOFF, AND THE DISTRIBUTION OF OTHER MAJOR POLLUTANTS IN THE WATERSHED. THE HYDRAULIC ANALYSIS WILL CONSIDER THE RATE OF SURFACE RUNOFF, RESISTANCE TO FLOW, SEDIMENT TRAPPING EFFICIENCY, SEDIMENT AND OTHER MAJOR POLLUTANTS RESISTANCE TIME, CHANNELIZATION FROM THE UPSTREAM AND PROGRESSIVE HEAD CUT FROM THE DOWNSTREAM END OF THE STRIP. THE HYDROLOGIC AND HYDRAULIC RESPONSE OF THE BUFFER STRIP IS DEPENDENT ON THE GEOMETRY OF THE WATERSHED. A RANGE OF CONDITIONS FROM FLAT LAND, INTERMEDIATE LAND, AND STEEP LAND WILL BE INVESTIGATED. THE VEGETATION ANALYSIS WILL CONSIDER THE TYPE, HEIGHT, DENSITY STIFFNESS, AND NATURAL AND FLOW-INDUCED VIBRATION FREQUENCY OF THE VEGETATIVE COVER. AN ENGINEERING ANALYSIS OF THE SEDIMENT CONTROL EFFICACY WILL BE MADE INTITALLY AND DOCUMENTED IN AN INTERIM REPORT. FINALLY, DESIGN CRITERIA INCLUDING THE DEVELOPED METHODOLOGY WILL BE PUBLISHED.

II-511

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DISPOSAL OF HIGH ALKALINE FLY ASH SLUDGE IN A DECOALED MINE SEAM

 START/ COMPL DATE :    09/77 - 08/79 : FUNDING : EST. - FY   77  / $  236000
  TASK/EPA CODE :F624A-048     / R805459     (GRANT)  PRIOR  FY   /          1
 PROJECT OFFICER : J W  JONES
 INVESTIGATORS :    D E MANZ
                    G H GROENEWOLD                UNIV. OF NORTH DAKOTA
                    Y   HUNG                      STATE GEOL. SURVEY
 MILE: 09/78 -ISSUE INTERIM REPORT                UNIV. OF NORTH DAKOTA
       09/79 -ISSUE FINAL REPORT
  OBJECTIVES: DETERMINE THE ENVIRONMENTAL EFFECTS OF SLUDGE DISPOSAL FROM A
  LIGNITE FLY ASH SO2 SCRUBBER (AT THE MILTON R. YOUNG POWER STATION,
   CENTER, NORTH DAKOTA) IN A DECOALED OPEN PIT MINE. MONITOR THE GRO
  UNDWATER AND LEACHATE IN THE PROXIMITY OF THE BURIED SLUDGE, AS WELL AS AN
  EXPOSED SURFACE SLUDGE POND. INVESTIGATE THE PROPERTIES OF SLUDGE, ASH AND
  SOIL. ASSESS THE STABILITY OF MINE SPOIL DEPOSITED OVER THE SLUDGE.
  APPROACH: (1) STUDY AVAILABLE MINE, SLUDGE, AND SLUDGE DISPOSAL CHARACTE
  RIZATIONS FROM A 3-YEAR MINING PLAN AND LABORATORY ANALYSES OF PILOT PLANT
   SLUDGE; (2) CONDUCT ADDITIONAL SLUDGE AND MINE CHARACTERIZATION; (3)
  CONDUCT EXTENSIVE SAMPLING AND TESTING PRIOR TO AND SUBSEQUENT TO: (A)
  CONSTRUCTION OF AN EXPOSED SURFACE SLUDGE POND, AND (B) INSTALLATION
  OF SEVERAL GROUNDWATER AND LEACHATE WELLS IN PROXIMITY OF BURIED SLUDGE IN
   THE DECOALED MINE SEAM AND SLUDGE POND, ANALYSES OF GROUNDWATER,
  LEACHATE, SUPERNATANT, SLUDGE AND SOIL FOR 15 MONTH PERIOD; (4) OBTAIN AND
   COMPILE COST INFORMATION FROM THE POWER PLANT FOR INCLUSION IN AN ECON
  OMY STUDY BY ARTHUR D. LITTLE, INC. OF DISPOSAL OF SLUDGE IN DECOALED MINE
  SEAM; (5) ASSESS THE DATA AND PREPARE THE FINAL REPORT, TO BE INCORPORATED
   IN AN ARTHUR D. LITTLE REPORT FOR CONTRACT 68-03-2334. CURRENT
  PLANS: PROJECT JUST INITIATED.
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ULTRASTRUCTURE AND X-RAY MICROANALYSIS OF MACROPHAGES EXPOSED TO
NONCRITERIA POLLUTANTS WITH EMPHASIS ON CERTAIN METAL COMPOUN
START/ COMPL DATE : 10/76 - 09/78 : FUNDING : EST. - FY 77 / $ 75000
TASK/EPA CODE :H601D-7316 / R805460 (GRANT) PRIOR FY / 1
PROJECT OFFICER : M D WATERS
INVESTIGATORS : J D SHELBURNE DUKE UNIVERSITY
M D WATERS U.S. ENVIRON. PROTECTION AGCY
MILE: 11/77 -PROJECT NOT YET INITIATED. ANTICIPATED AWARD

A CRITICAL PROBLEM IN CORRELATING THE RESULTS OF CHEMICAL ANALYSES AND BIOLOGICAL SCREENING TESTS WITH RESPECT TO THE POTENTIAL BIOHAZARDS OF A GIVEN CRUDE SAMPLE IS THE DEGREE TO WHICH THE BIOLOGICAL AVAILABILITY OF THE SAMPLE IS UNDERSTOOD. THAT IS, WE NEED TO KNOW THE NATURE OF SURFACE CHEMISTRY AND THE POTENTIAL OF A COMPLEX SAMPLE TO RELEASE COMPONENTS TO BIOLOGICAL FLUIDS AND TISSUES. OUR OBJECTIVE IS TO EXPOSE RABBIT ALVEOLAR MACROPHAGES (RAMS) IN VITRO TO A VARIETY OF ELEMENTS (SPECIFICALLY CADMIUM, VANADIUM, NICKEL, MANGANESE, CHROMIUM, IRON, LEAD, COPPER AND ZINC) AT DIFFERING CONCENTRATIONS AND TIMES, AND TO A VARIETY OF PARTICLES (BOTH FLY-ASH PARTICLES COATED WITH KNOWN ELEMENTS AND REPRESENTATIVE ELEMENTS SELECTED FROM URBAN AIR) IN ORDER TO DEFINE MORPHOLOGICALLY THE SUBCELLULAR REACTION OF THESE MACROPHAGES TO INJURY. ELECTRON PROBE MICROANALYSIS WILL BE USED TO STUDY THE MORPHOLOGY AND DISTRIBUTION OF THE TOXIC ELEMENTS IN QUESTION. CONSEQUENTLY A PARALLEL AND IMPORTANT OBJECTIVE OF THIS WORK WILL BE TO EXAMINE IN DETAIL THE LIMITATIONS AND USEFULNESS OF A NUMBER OF MICROHISTOLOGICAL TECHNIQUES FROM A QUALITATIVE AND SEMI-QUANTITATIVE POINT OF VIEW IN ORDER TO OPTIMIZE TECHNIQUES FOR THE IDENTIFICATION, LOCALIZATION AND DISTRIBUTION OF THESE ELEMENTS.

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NONPOINT SOURCE SEDIMENT PRODUCTION IN THE COLUSA BASIN DRAINAGE AREA,
CALIFORNIA
   START/ COMPL DATE :    10/77 - 09/81 : FUNDING : EST. - FY   77  / $  170000
    TASK/EPA CODE :L617A-06      / R805462-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : A G  HORNSBY
   INVESTIGATORS :   K K TANJI                         UNIV. OF CALIFORNIA
                     J W BIGGAR                        UNIV. OF CALIFORNIA
                     D W HENDERSON                     UNIV. OF CALIFORNIA
                     M J SINGER                        UNIV. OF CALIFORNIA
                     L D WHITTIG                       UNIV. OF CALIFORNIA
   MILE: 10/79 -FINAL REPORT, PHASE I
     THIS PROJECT PROPOSES TO IDENTIFY THE POTENTIAL NONPOINT SOURCES OF SU
     SPENDED MATTER IN THE UPLAND AND VALLEY FLOOR OF THE COLUSA BASIN DRAINAGE
     AREA IN THE WEST SIDE OF THE SACRAMENTO RIVER BASIN. THE UPLAND AREA
     CONSISTS OF 1700 SQUARE MILES OF WATERSHED AND THE VALLEY FLOOR IS DEVOTED
      PRIMARILY TO IRRIGATED AGRICULTURE. A 70-MILE LONG COLUSA BASIN DRAIN
      CONVEYS FLOOD RUNOFFS AND IRRIGATION RETURN FLOWS. THE DRAIN CONTAINS
      A SIGNIFICANT SEDIMENT LOAD AND DISCHARGES INTO THE SACRAMENTO RIVER
     TYPICALLY RAISING THE TURBIDITY IN THIS RIVER TO ABOUT 20 JACKSON TURBIDI
     TY UNITS (JTU) FROM ABOUT 5 JTU. TO THE BEST OF OUR KNOWLEDGE, THE FACTORS
      CONTRIBUTING TO OR AFFECTING THE SEDIMENT LOAD IN COLUSA BASIN DRAIN
     HAVE NOT BEEN FULLY ASCERTAINED AS YET. THE SUSPENDED MATTER PROBLEM IS
     UNIQUE IN THAT IT DOES NOT SETTLE OUT EVEN UNDER VERY LOW CURRENT
     VELOCITIES. THIS PROJECT WILL DETERMINE THE PHYSICAL, CHEMICAL, AND MINE
     RALOGICAL CHARACTERISTICS OF THE SUSPENDED AND BED LOAD MATERIALS AND FLOW
     VOLUME AND CURRENT VELOCITY TO UNDERSTAND THEIR TRANSPORT, DEP
     OSITION, AND RESUSPENSION ALONG WITH THEIR PRODUCTION. THE RESULTS OF THIS
     RESEARCH WILL BE USEFUL TO FORMULATE BEST MANAGEMENT PRACTICES TO CONTROL
     EROSION AND MINIMIZE SEDIMENT PRODUCTION.
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II-514

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DEVELOPMENT AND APPLICATION OF LABORATORY MICROCOSMS FOR PERTURBATION
EXPERIMENTS OF COASTAL MARINE ECOSYSTEMS
   START/ COMPL DATE :    09/77 - 09/79 : FUNDING : EST. - FY   77  / $   75500
    TASK/EPA CODE :P608C-08       / R805463-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : K     PEREZ
   INVESTIGATORS :    S W NIXON                      UNIV. OF RHODE ISLAND
                      S A OVIATT                     UNIV. OF RHODE ISLAND
                      K T PEREZ                      UNIV. OF RHODE ISLAND
   MILE: 09/79 -FINAL REPORT ENTITLED, "DEVELOPMENT AND APPLICATION OF LABORATO
     OBJECTIVES: 1) TO DEVELOP MARINE MICROCOSM METHODOLOGY, 2) TO COMPARE
     SMALL AND LARGE MICROCOSM BEHAVIOR, 3) TO ASSESS THE EFFECTS OF SEWAGE
     ADDITION AND STRESSES OPERATING ALONG ESTABLISHED SEWAGE GRADIENTS AND
     RECOVERY FROM THESE PERTURBATIONS, 4) TO ASSESS TIME VARYING PERTURBATIONS
      OF 3, 5) TO USE THE MICROCOSMS TO DETERMINE THE EFFECTS OF MULTIPLE S
     TRESSES ON ESTUARINE ECOSYSTEMS AND 6) TO USE THE MICROCOSMS TO UNDERSTAND
     STABILITY AND RESILIENCY IN ESTUARINE ECOSYSTEMS. APPROACH: WE PRO
     POSE TO CONTINUE WORK WITH 12 EXPERIMENTAL MICROCOSMS WHICH ARE MAINTAINED
     IN A WATER BATH IN THE EPA ENVIRONMENTAL RESEARCH LABORATORY,
     NARRAGANSETT, RI. THE TANKS WILL BE FILLED WITH HAND BUCKETED WATER FROM
     NARRAGANSETT BAY TO PREVENT DAMAGE TO PLANKTON, AND INTERMIXED TO PRODUCED
     UNIFORM INITIAL CONDITIONS IN ALL OF THE MICROCOSMS. NEW SEDIMENT WILL BE
     COLLECTED BY BOX CORE AT THE START OF EACH SERIES OF EXPERIMENTS. THE B
     IOLOGICAL PARAMETERS IN THE MICROCOSM WILL THEN BE FOLLOWED FOR ONE OR TWO
     WEEKS TO BE SURE THAT THEY ARE NOT DIVERGING BEFORE SPECIFIC EXPER
     IMENTS ARE BEGUN. CURRENT PLANS: FOUR SERIES OF EXPERIMENTS ARE PLANNED AS
     FOLLOWS: 1) SCALING EXPERIMENTS WITH LIGHT AND TURBULENT MIXING, 2) COMPA
     RISON OF THE BEHAVIOR OF SMALL MICROCOSMS WITH LARGE MICROCOSMS, 3) STRESS
     EXPERIMENTS ON MICROCOSMS WITH DIFFERENT LEVELS OF SEWAGE, AND 4) MIXED
     OLIGOTROPHIC AND EUTROPHIC EXPERIMENTS.
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PREVENTION AND CONTROL OF SPILLAGE OF PESTICIDES FROM AGRICULTURAL
OPERATIONS INCLUDING AERIAL AND GROUND APPLICATIONS
   START/ COMPL DATE :    09/77 - 03/79 : FUNDING : EST. - FY   77  / $   30000
    TASK/EPA CODE :1B610A-634    / R805466-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : F J  FREESTONE
   INVESTIGATORS :   H   KAZIMIER                        STATE AERONAUTICS COMMISSION
                     W   REYNOLDS                        STATE AERONAUTICS COMMISSION
                     R F WAKASCH                         PURDUE UNIVERSITY
                     J C NYE                             PURDUE UNIVERSITY
                     A C YORK                            PURDUE UNIVERSITY
                     R A GREENKORN                       PURDUE UNIVERSITY
   MILE: 08/77 -FUNDING PACKAGE SUBMITTED
         09/77 -AWARD FUNDS FOR PROJECT
         12/77 -APPLY INCREMENTAL FUNDING
         03/79 -FINAL REPORT RECEIVED
     THE OVERALL OBJECTIVE OF THE PROJECT IS TO DEVELOP A UNIVERSALLY
     ACCEPTABLE SYSTEM TO PREVENT SPILLAGE OF PESTICIDES FROM AGRICULTURAL OPE
     RATIONS. THIS WILL BE DONE IN THE FOLLOWING MANNER: BY EVALUATING EXISTING
     HANDLING, MIXING, CLEAN-UP AND DISPOSAL METHODS IN USE BY COMMERCIAL
      AGRICULTURAL APPLICATORS; BY DEMONSTRATING AN EQUIPMENT WASHING
     SYSTEM WHICH STOPS THE INDISCRIMINATE DUMPING OF THE TOXIC
     CHEMICALS; BY DEVELOPING AN ECONOMICAL PORTABLE WASHWATER TREATMENT SYSTEM
     THAT CAN BE OPERATED BY NON-TECHNICAL PERSONNEL; AND EVALUATING
     FEASIBILITY OF RECYCLING WATER AFTER THE TREATMENT.
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II-516

805467

Objectives

To determine the extent of understanding of Indian nations regarding the dangers and most efficacious use of pesticides; extent of use; tribal powers of control. To determine options and develop models for pesticide regulation on Indian reservations; to determine possibilities for alternative methods of pest control such as integrated pest management; to determine costs of enforcement programs and to establish effective communication between EPA and the Indian company.

Approach

Conduct informational/research sessions with approximately 200 tribes. Prepare models, reports and provide follow up assistance.

II-517

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RIVULUS MARMORATUS - AN INVESTIGATION OF ITS POTENTIAL AS A CANCER
RESEARCH AND CHEMICAL CARCINOGEN SCREENING ORGANISM
   START/ COMPL DATE :    09/77 - 08/79 : FUNDING : EST. - FY   77  / $   86000
    TASK/EPA CODE :Q625F-1-07    / R805469-01  (GRANT)  PRIOR  FY   /        1
   PROJECT OFFICER : W P  DAVIS
   INVESTIGATORS :   C C KOENIG                     COLL. OF CHARLESTON
                     B J HART                       COLL. OF CHARLESTON
                     A R STARCK                     COLL. OF CHARLESTON
                     C   MCMILLAN                   COLL. OF CHARLESTON
   MILE: 08/79 -FINAL REPORT
     RECENT EVIDENCE SUGGESTS A RELATIONSHIP BETWEEN ENVIRONMENTAL CONTAMINANTS
      AND CANCER. IT SHOULD BE RECOGNIZED THAT CANCER IS THOUGHT TO BE A MULT
     ISTEP PROCESS WITH GENETIC ALTERATION AS THE INITIAL STEP. THE MUTAGENIC A
     CTIVITY OF ENVIRONMENTAL CONTAMINANTS MAY THEREFORE GIVE A GOOD INDICATION
      OF POTENTIAL CARCINOGENICITY AND TERATOGENICITY MAY BE AN INDICATION OF
     MUTAGENICITY. THE NEED FOR A MARINE VERTEBRATE SENSITIVE TO CHEMICAL
     CARCINOGENS IS GREAT BECAUSE THERE IS GOOD EVIDENCE THAT THE COASTAL M
     ARINE ENVIRONMENT IS BEING CONTAMINATED AT AN ACCELERATED RATE. THE MARINE
     FISH RIVULUS MARMORATUS POSSESSES NUMEROUS ATTRIBUTES THAT MAKE IT
     PARTICULARLY ATTRACTIVE AS A CANCER RESEARCH AND/OR SCREENING ORGANISM. A
     NUMBER OF MORE OBVIOUS ATTRIBUTES OF THIS FISH INCLUDE: HARDINESS, EA
     SE OF MAINTENANCE, DEVELOPMENTAL ASPECTS, SHORT GENERATION TIME, FECUNDITY
      AND UNIQUE GENETIC AND REPRODUCTIVE ASPECTS WHICH ARE FOUND IN NO OTHER
     VERTEBRATES (ISOGENIC, HOMOZYGOUS CLONES OF NATURAL HERMAPHRODITES
     WHICH REPRODUCE BY INTERNAL SELF-FERTILIZATION). WE PROPOSE TO EVALUATE
     THE POTENTIAL OF R. MARMORATUS AS A CANCER RESEARCH AND SCREENING OR
     GANISM. TWO GENERAL APPROACHES WILL BE TAKEN: GENETIC CHARACTERIZATION AND
     CORRELATION OF EFFECTS WITH KNOWN CHEMICAL CARCINOGENS. INFORMATION
     GATHERED FROM THE GENETIC CHARACTERIZATION (ELECTROPHORETIC, TR
     ANSPLANTATION AND CYTOGENETIC TECHNIQUES WILL BE USED) MAY BE APPLIED DIRE
     CTLY IN THE ASSESSMENT OF MUTAGENICITY. ALSO, ROUTINE HISTOLOGICAL AND DEV
     ELOPMENTAL ANALYSIS WILL BE MADE TO BROADEN OUR BASE OF POTENTIAL EFFECTS.
     THUS, CORRELATIVE INFORMATION DEVELOPED FROM MUTAGENIC EFFECTS OF KNOWN
     CHEMICAL CARCINOGENS MAY BE EXTENDED TO OTHER POTENTIAL CHEMICAL
     CARCINOGENS.
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COMBINED RUNOFF, HYDRAULIC AND WATER QUALITY MODELS

   START/ COMPL DATE :    10/77 - 10/79 : FUNDING : EST. - FY   77  / $   15000
    TASK/EPA CODE :K609A-410     / R805471-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : J W  FALCO
   INVESTIGATORS :   W M SCHOFIELD                    UNKNOWN INST. OR INDIV. GRANT
   MILE: 10/77 -START PROJECT
         10/78 -INTERIM REPORT DESCRIBING PROGRESS OF PROJECT
         10/79 -FINAL REPORT DESCRIBING RESULTS AND GUIDANCE FOR USE OF LINKED
     THE PURPOSE OF THIS PROJECT IS TO COMBINE THE STORM RUNOFF MODEL AND THE
     EXPLORE-I HYDRAULIC AND WATER QUALITY MODEL IN SUCH A FASHION THAT THE
     ALLIED FORTRAN PROGRAM CAN BE MADE TO RUN ON A SINGLE PASS. ANOTHER
     OBJECTIVE IS TO RESTRUCTURE THE COMBINED PROGRAM SO THAT IT CAN BE RUN ON
     THE SMALLER COMPUTERS USUALLY AVAILABLE TO THE ENGINEERING FIRMS DOING
     IMPACT STUDIES; SUCH MACHINES SHOULD NOT EXCEED 64K EIGHT-BIT BYTES OF
     CORE AND HAVE NO MORE THAN ONE TAPE AND ONE DISK PLUS PRINTER AS PER
     IPHERALS. THE APPROACH IS AS FOLLOWS: (1) REDUCE THE SIZE OF THE CORE REQU
     IRED FOR DATA STORAGE BY OVERLY METHODS; (2) REDUCE THE NUMBER OF PROGRAMS
      THAT MUST BE CORE RESIDENT AT ANY ONE TIME; (3) CALIBRATE THE VARIOUS
     PARTS OF THE COMBINED PROGRAM AT SPECIFIED CHECK POINTS; AND (4) CALIBRATE
      BOTH THE COMBINED PROGRAM AND A SENSITIVITY STUDY OF THE SAME. THE
     COMPUTER PROGRAMS FOR THE TWO MODELS HAVE BEEN EXAMINED AND FOUND TO BE F
     LEXIBLE ENOUGH TO ACCOMPLISH THE NECESSARY OVERLAY WORK. AN INTERDATA 7/16
     COMPUTER HAS BEEN CHOSEN AND THE COMPILER AND UTILITY ROUNTINES HAVE BEEN
      EXAMINED AND FOUND TO BE ADEQUATE. A FINAL REPORT WILL BE PUBLISHED AT
     THE END OF THE PROJECT DESCRIBING THE RESULTS AND GIVING GUIDANCE FOR
     THE USE OF THE LINKED MODEL.
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II-578

CAUSES OF DEATH OF ANESTHETISTS FROM THE CHLOROFORM ERA

START/ COMPL DATE :   10/77 - 10/78 : FUNDING : EST. - FY   77 / $ 56425
TASK/EPA CODE :D6148-112   / R805473-01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER : J   LUCAS
INVESTIGATORS :   H W LINDE   NORTHWESTERN UNIVERSITY
P S MESNICK   NORTHWESTERN UNIVERSITY
MILE: 10/78 -FINAL REPORT

WE PROPOSE TO STUDY THE MORTALITY OF PHYSICIANS WHO GAVE ANESTHESIA DURING THE PERIOD WHEN CHLOROFORM WAS IN COMMON USE AND TO ASCERTAIN THEIR CAUSES OF DEATH TO DETERMINE IF THERE WERE EXCESSIVE DEATH DUE TO CANCER. TO DO THIS, WE PROPOSE TO DETERMINE THE NAMES OF ANESTHETISTS DYING PRIOR TO 1947 (WHEN OUR PREVIOUS STUDY OF CAUSES OF DEATH AMONG A NESTHESIOLOGISTS STARTED) AND TO OBTAIN THEIR CAUSES 1947-1956, 1957-1966, STUDY AND 1967-1972. WE WILL ALSO STUDY THE LITERATURE AND HISTORICAL RECORDS TO ARRIVE AT AN ESTIMATE OF THE USE OF CHLOROFORM IN AMERICAN ANESTHESIA DURING THE EARLIER PART OF THIS CENTURY.

OPTIMIZATION OF LAND CULTIVATION PARAMETERS

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   START/ COMPL DATE :    08/77 - 06/78 : FUNDING : EST. - FY   77  / $   50000
    TASK/EPA CODE :B623C-621    / R805474     (GRANT)  PRIOR  FY76 /          1
   PROJECT OFFICER : J S  FARLOW
   INVESTIGATORS :   K   BROWN                    TEXAS A & M UNIVERSITY SYSTEM
   MILE: 07/77 -FUNDING PACKAGE SUBMITTED
         08/77 -AWARD FUNDS FOR PROJECT
         06/78 -FINAL REPORT RECEIVED
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RESEARCH IS TO BE CONDUCTED ON THE LAND DISPOSAL OF TANK BOTTOM AND API SEPARATOR WASTES. THE INVESTIGATION WILL UTILIZE THREE DIVERSE WASTES, AND TESTS WILL BE CONDUCTED ON SEVERAL SOILS REPRESENTING A RANGE OF CHARACTERISTICS. THE INVESTIGATION WILL BEGIN WITH CHARACTERIZATION OF THE WASTES. THIS DATA WILL BE USED TO DECIDE ON THE APPLICATION RATES TO BE USED IN THE STUDIES. MEASUREMENTS WILL BE MADE OF THE DECOMPOSITION RATE OF THE WASTES, THE INFLUENCE OF APPLICATIONS ON PLANT SURVIVAL AND GROWTH, AND THE CONCENTRATIONS OF POTENTIAL POLLUTANTS IN RUNOFF AND LEACHATE WATER. THE FATE AND MOBILITY OF THE WASTES IN THE SOIL WILL BE INVESTIGATED IN THE LABORATORY, IN GREENHOUSE TESTS, AND ULTIMATELY, IN FIELD TESTS. THE RESEARCH SHOULD PROVIDE INSIGHT INTO THE FEASIBILITY OF LAND DISPOSAL OF THIS CLASS OF WASTE, AND THE RESULTS WILL BE USED TO DEVELOP CRITERIA TO BE USED IN THE DESIGN, MANAGEMENT, AND MONITORING OF OILY WASTE DISPOSAL OPERATIONS.

II-520

SOIL DISPOSAL OF API PIT WASTES

START/ COMPL DATE : 09/77 - 08/80 : FUNDING : EST. - FY 78 / $ 69992
TASK/EPA CODE :C618A-7229 / R805474 (GRANT) PRIOR FY77 / $ 1000001
PROJECT OFFICER : R E LANDRETH
INVESTIGATORS : K W BROWN TEXAS A & M UNIVERSITY SYSTEM
MILE: 12/78 -INTERIM REPORT
12/80 -FINAL REPORT

RESEARCH IS TO BE CONDUCTED ON THE LAND DISPOSAL OF API PIT WASTES. THE INVESTIGATION WILL UTILIZE THREE DIVERSE WASTES, AND TESTS WILL BE CONDUCTED ON SEVERAL SOILS REPRESENTING A RANGE OF CHARACTERISTICS. THE INVESTIGATION WILL BEGIN WITH CHARACTERIZATION OF THE WASTES. THIS DATA WILL BE USED TO DECIDE ON THE APPLICATION RATES TO BE USED IN THE STUDIES. MEASUREMENTS WILL BE MADE OF THE DECOMPOSITION RATE OF THE WASTES, THE INFLUENCE OF APPLICATIONS ON PLANT SURVIVAL AND GROWTH, AND THE CONCENTRATIONS OF POTENTIAL POLLUTANTS IN RUNOFF AND LEACHATE WATER. THE FATE AND MOBILITY OF THE WASTES IN THE SOIL WILL BE INVESTIGATED IN THE LABORATORY, IN GREENHOUSE TESTS, AND ULTIMATELY, IN FIELD TESTS. THE RESEARCH SHOULD PROVIDE INSIGHT INTO THE FEASIBILITY OF LAND DISPOSAL OF THIS CLASS OF WASTE, AND THE RESULTS WILL BE USED TO DEVELOP CRITERIA TO BE USED IN THE DESIGN, MANAGEMENT, AND MONITORING OF SOIL WASTE DISPOSAL OPERATIONS.

METHODOLOGIES FOR UTILIZATION OF ENVIRONMENTAL-IMPACT-ASSESSMENT DATA

START/ COMPL DATE : 00/00 - 00/00 : FUNDING : EST, - FY 77 / $ 59529
TASK/EPA CODE :F623A-38 / R805476-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : C T RIPBERGER
INVESTIGATORS : L R BABCOCK UNIV, OF ILLINOIS
R A WADDEN UNIV, OF ILLINOIS
MILE: 10/78 -COMPLETE RESEARCH RELATED TO HEALTH EFFECT LINKAGES
10/79 -COMPLETE RESEARCH RELATED TO TRANSPORT-TRANSFORMATION
10/80 -COMPLETE INTEGRATION STUDIES

THE PROPOSED RESEARCH SEEKS TO DEFINE METHODOLOGICAL APPROACHES FOR USE WITHIN EPA WHICH WOULD FACILITATE THE IDENTIFICATION OF HAZARDS AND SETTING OF STANDARDS AND CONTROL PRIORITIES. A NEW COMPREHENSIVE TYPE OF ASSESSMENT DATA IS BEING GENERATED WITHIN EPA, AND THE PROPOSED RESEARCH, IN PART, WOULD ATTEMPT TO DEFINE HOW SUCH INFORMATION MIGHT BE BEST UTILIZED BY HEALTH-EFFECTS, ATMOSPHERIC-CHEMISTRY AND OTHER INVOLVED GROUPS IN ORDER TO GENERATE MEANINGFUL CAUSE-EFFECT RESULTS IN THE SHORTEST TIME. THE RESEARCH WILL INCLUDE DEFINITION OF PERTINENT EPA UNITS AND PROCEDURES AND OBSTACLES TO INTERCHANGE OF RESEARCH RESULTS. METHODS FOR IMPROVING KNOWLEDGE TRANSFER WILL BE PROPOSED. COMPREHENSIVE ALTERNATIVES TO "SINGLE-POLLUTANT" METHODS WILL BE DEVELOPED. SEVERAL APPROACHES WILL BE CONSIDERED INCLUDING, BUT NOT LIMITED TO, THOSE BASED ON PREVIOUSLY-DEVELOPED AIR QUALITY INDEXES, PRIORITIZATION METHODOLOGIES, AND ASSESSMENTS OF HYPERSENSITIVE POPULATIONS. THE FIRST YEAR WILL EMPHASIZE LINKAGES BETWEEN THE INDUSTRIAL ENVIRONMENTAL RESEARCH LABORATORY AND HEALTH EFFECTS AND STANDARDS-SETTING UNITS OF EPA. THE SECOND YEAR WOULD EMPHASIZE LINKAGES WITH TRANSPORT-AND-TRANSFORMATION RESEARCH. THE THIRD YEAR WOULD EMPHASIZE INTEGRATION OF DIVERSE ASPECTS OF THE ENVIRONMENTAL MANAGEMENT SYSTEM.

CHEMICAL STUDIES DIRECTED TOWARDS ECOLOGICAL DAMAGE ASSESSMENT OF
PETROLEUM DISCHARGES INTO THE MARINE ENVIRONMENT

START/ COMPL DATE : 09/77 - 09/80 : FUNDING : EST. - FY 77 / $ 64990
TASK/EPA CODE :P608C-11 / R805477-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : P LEFCOURT
INVESTIGATORS : J G QUINN UNIV. OF RHODE ISLAND
E J HOFFMAN UNIV. OF RHODE ISLAND

MILE: 09/80 -FINAL REPORT ENTITLED, "CHEMICAL STUDIES DIRECTED TOWARDS ECOLO

OBJECTIVES: TO CONDUCT ANALYTICAL CHEMICAL STUDIES IN SUPPORT OF ECOLOGICAL DAMAGE ASSESSMENT OF ACUTE AND CHRONIC DISCHARGES OF PETROLEUM INTO THE NEAR-SHORE MARINE ENVIRONMENT. THESE STUDIES WILL INCLUDE THE FOLLOWING: (1) CHEMICAL ANALYSES OF PETROLEUM COMPOUNDS IN SELECTED SAMPLING OF WATER, SEDIMENTS AND ORGANISMS USING A VARIETY OF ANALYTICAL PROCEDURES (E.G. COLUMN, THIN-LAYER, LIQUID AND GAS CHROMATOGRAPHY; INFRARED AND FLUORESCENCE SPECTROSCOPY; AND COMBINED GAS CHROMATOGRAPHY-MASS SPECTROMETRY), (2) DEVELOPMENT AND NEW METHODS AND MODIFICATION OF EXISTING PROCEDURES IN SUPPORT OF TOXICOLOGICAL AND FIELD STUDIES. (3) PARTICIPATION WITH OTHER FEDERAL LABORATORIES IN THE DEVELOPMENT AND INTERCALIBRATION OF STANDARD REFERENCE MATERIALS AND METHODS FOR PETROLEUM ANALYSIS.APPROACH: SAMPLES WILL BE COLLECTED FROM SELECTED SPILLS OF OPPORTUNITY AND SITES OF CHRONIC OIL DISCHARGES. THE BASIC ANALYSIS OF THESE SAMPLES WILL INVOLVE EXTRACTION, ISOLATION OF PETROLEUM COMPOUNDS BY COLUMN AND/OR THIN-LAYER CHROMATOGRAPHY, AND ANALYSIS BY GAS CHROMATOGRAPHY USING PACKED METAL COLUMNS AND GLASS CAPILLARY COLUMNS. SELECTED SAMPLE EXTRACTS WILL ALSO BE ANALYZED BY HIGH PRESSURE LIQUID CHROMATOGRAPHY, INFRARED AND FLUORESCENCE SPECTROSCOPY, AND COMBINED GAS CHROMATOGRAPHY-MASS SPECTROMETRY. IN COMBINATION WITH FIELD EVALUATION AND LABORATORY TOXICOLOGICAL INVESTIGATIONS, THE PROPOSED RESEARCH WILL ALLOW A HIGHLY INTEGRATED, MULTIDISCIPLINARY STUDY OF THE FATE AND EFFECTS OF OIL ON THE ECOSYTEM.

805478

II-523

This work is aimed at developing tools which can be used for relating the configurational changes and the system capacity for a computer system executing the desired workload. A combination of simulation and analytic modelling is proposed here as the basic approach to be used. The validation of the models will be done with respect to the Univac equipment at the University of Maryland.

805482 II - 524

It is now recognized that animal bioassays are inadequate for monitoring the thousands of environmental agents which require screening as possible carcinogens. Several short-term in vitro tests for mutagenicity and carcinogenicity are currently being evaluated (by governmental agencies, private industry and various research groups). Since many environmental mutagens and carcinogens require prior metabolism or whole cells to exert their effects. Some of these short-term assays use a rat liver microsomal fraction for activation of the chemical being tested. There is a paucity of information, however, on whether or not the activation of a known carcinogen and its covalent binding to cellular DNA in these in vitro systems is quantitatively and qualitatively similar to that which occurs in intact mammalian cells, or in the whole animal. The objective of this proposal is to examine the modified DNA from cells used in these assays after exposure to the ubiquitous carcinogen benzo (a) pyrene (BP). The approach will be to incubate tritium labeled BP with microsomes and Salmonella typhimurium tester strains, or with various mammalian cell lines. Cellular DNA will then be extracted, analyzed for radioactivity and fluorescense, and then hydrolyzed to nucleosides which will be analyzed by high pressure liquid chromatography, utilizing appropriate BP-nucleoside derivatives prepared chemically as markers to determine the nature of the BP-nucleoside adducts present. Parallel assays will be done for mutagenicity and transformation and of aryl hydrocarbon hydroxylase and epoxide hydratase activities. The data will be correlated with our results obtained in intact human tissues where it has been possible to determine the structure of the major adduct formed. This application does not involve recombinant DNA.

805484

II-525

PURPOSE

The objective of this proposal is to develop information on the integrated use of pesticides for the home and garden. A brochure will be developed which will be easy to read and use. It will stress the use of an integrated approach to home and garden pest management. Such information should serve to help the consumer through the baffling array of pesticides from which he must choose over the counter. At the same time, the consumer will be given alternate solutions to pest problems such as environmental modification, e.g., litter and trash removal, screening, pest/predator roles in garden culture and mechanical or manual methods of pest control. Brand names will not be used. The overriding objective is to aid in reducing adverse effects of pesticide use.

METHOD

National Audubon proposes to sublet part of the grant to the John Muir Institute in California. The Institute will research and develop the technical materials on integrated home and garden pest management for inclusion in the brochure. The John Muir Institute has developed some information in the subject area outlined previously and the National Audubon will capitalize on this developing technology by expanding the scope of that project's work for incorporation into a nationally pertinent publication.

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PHAGE RESISTANCE AS A MEANS OF SEPARATING HUMAN AND ANIMAL E. COLI
STRAINS AND DEFINING COLONIZATION
   START/ COMPL DATE :    08/77 - 07/79 : FUNDING : EST. - FY   77  / $   21800
    TASK/EPA CODE :D607A-038     / R805488-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : V J  CABELLI
   INVESTIGATORS :   P S COHEN                      UNIV. OF RHODE ISLAND
   MILE: 07/78 -DEVELOP METHODS FOR DISTINGUISHING HUMAN FROM ANIMAL E. COLI ST
         07/79 -APPLY METHODS IN DETERMINING THE RELATIVE PROPORTIONS OF HUMAN
     THE OBJECTIVES OF THIS PROJECT ARE: (A) TO EXAMINE THE RELATIONSHIP
     BETWEEN THE COLIPHAGE BIOTYPES OF E. COLI STRAINS AND THEIR ABILITY TO
     COLONIZE THE GASTRUINTESTINAL TRACTS OF WARM-BLOODED ANIMALS. (B) TO DIST
     INGUISH BETWEEN HUMAN AND ANIMAL FECAL E. COLI STRAINS BY COLIPHAGE BIOTYP
     ING. IT IS HOPED THAT THESE STUDIES WILL ALLOW US TO DEVELOP RAPID METHODS
      FOR DISTINGUISHING BETWEEN HUMAN AND ANIMAL FECAL E. COLI STRAINS
     WHICH, IN TURN, WILL ALLOW RAPID ASSESSMENT AS TO WHETHER NATURAL WATERS
     ARE POLLUTED WITH LOWER ANIMAL OR HUMAN FECAL WASTES.
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The Estuarine Research Federation is making arrangements for the "Fourth International Symposium on Estuaries" to beheld on October 2-5, 1977 at Mt. Airy Lodge, Pennsylvania. The theme is "Estuarine Processes" but conveners have been encouraged to emphasize management problems, e.g., implications of energy development on the coastal and estuarine environment and a better definition of the relationship between primary and secondary productivity. We expect about 1,000 representatives from governmental agencies, universities, and industry.

Thematically the program will address four principal topic areas comprised of about 45 invited papers. These are: Estuarine Development and Resource Management, Estuarine Communities and Ecosystem Relationships, Man-Estuary Interactions and Estuary-Nearshore Interactions. Special interest symposia supplement the program to cover six special topics.

II-528

THE NEW ATLANTA - AN URBAN ENVIRONMENTAL FUTURES CONFERENCE

START/ COMPL DATE : 00/00 - 00/00 : FUNDING : EST. - FY 77 / $ 20000
TASK/EPA CODE :W619 -01 / R805491-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : J GERBA
INVESTIGATORS : R HANIE — ATLANTA TWO THOUSAND INC.
E P ODUM — UNIV. OF GEORGIA
E GOLDSMITH — ECOLOGIST
J P MILTON — THRESHOLD INCORPORATED
MILE: 03/79 -FINAL REPORT "ALTERNATIVES FOR GREATER ATLANTA"

OBJECTIVE: THIS PROPOSAL OUTLINES A STUDY CONFERENCE TO EXPLORE THE PROBABLE SHORT (5-10 YEARS), INTERMEDIATE (10-20 YEARS) AND LONG-RANGE (20-30 YEARS) ENVIRONMENTAL FUTURE OF GREATER ATLANTA AND THE SOUTHEAST REGION. ALTHOUGH THE PRIMARY FOCUS IS ON THE METROPOLITAN AREA OF GREATER ATLANTA, ENVIRONMENTAL PROCESSES AFFECTING THE CITY AT BOTH REGIONAL AND NATIONAL LEVELS WILL ALSO BE EXAMINED BY THE CONFERENCE. APPROACH: THE URBAN ENVIRONMENTAL FUTURES CONFERENCE WILL BRING TOGETHER A WIDE RANGE OF INVOLVED CITIZENS, COMMUNITY LEADERS, REGIONAL DECISIONMAKERS AND PLANNERS, AND NATIONAL RESOURCE EXPERTS. THE CONFERENCE STRUCTURE PROPOSED HERE HAS BEEN CAREFULLY DESIGNED TO ALLOW THE CONFEREES TO ACCOMPLISH THE FOLLOWING PURPOSES: TO IDENTIFY AND EXAMINE MAJOR CURRENT TRENDS AND ISSUES AFFECTING THE URBAN ENVIRONMENTAL PLANNING AND MANAGEMENT; TO IDENTIFY COMMON ENVIRONMENTAL GOALS; AND TO DEVELOP NEW APPROACHES FOR ACHIEVING THESE ALTERNATIVE GOALS. LASTLY, A PRIMARY PURPOSE OF THE CONFERENCE IS TO DEMONSTRATE AN IMPROVED PROCESS FOR INVOLVING CITIZENS IN GOAL SETTING AND PLANNING FOR ENVIRONMENTAL QUALITY. CURRENT PLANS: CONFERENCE SCHEDULED FOR SEPTEMBER 22-24, 1977, URBAN LIFE AUDITORIUM, GEORGIA STATE UNIVERSITY, ATLANTA, GA. CONTENT OF CONFERENCE ESTABLISHED. MECHANICS OF CONFERENCE UNDERWAY BY PLANNING TEAM.

805493

II-529

A mobile pilot plan consisting of electrochemical coagulation/flotation followed by sand filtration will be designed, constructed and operated at several seafoods processing plants to determine the technical and economic feasibility of the processes. The sludges will be evaluated for possible utilization.

II-530

STUDIES RELATED TO THE ORGANIC CHEMICAL ANALYSIS OF INDUSTRIAL SAMPLES

START/ COMPL DATE : 09/77 - 10/79 : FUNDING : EST. - FY 77 / $ 28000
TASK/EPA CODE :F623A-28 / R805494-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : L D JOHNSON
INVESTIGATORS : C H LOCHMULLER DUKE UNIVERSITY
MILE: 09/77 -GRANT STARTS
11/79 -FINAL REPORT

OBJECTIVE: THE OBJECTIVE OF THESE STUDIES IS TO PROVIDE A FIRMER UNDERSTANDING OF THE BEHAVIOR OF POROUS POLYMER SORBENTS IN SOURCE SAMPLING EFFORTS. APPROACH: PREVIOUS WORK HAS DEALT WITH THE EFFECTS OF REACTION WITH ACIDS AND ACID GASES ON THE SORPTION CAPACITY AND SELECTIVITY OF THESE MATERIALS. RESULTS TO DATE INDICATE THAT SULFONATION AND NITRATION CAN INDEED AFFECT BOTH THE AMOUNT AND THE RELATIVE DISTRIBUTION OF REPRESENTATIVE ORGANIC COMPOUNDS ON THESE SORBENTS. THIS EFFECT WILL BE ESPECIALLY SIGNIFICANT IF THE SAMPLING EFFORT IS CARRIED OUT PAST "BREAKTHROUGH"; THAT IS, IF THE SORBENT TRAP CAPACITY IS EXCEEDED BY THE CHALLENGE CONCENTRATION. POROUS POLYMER SORBENTS HAVE BEEN USED TO SAMPLE AMBIENT AIR AND SOURCES AT TEMPERATURES IN WHICH THE PRINCIPAL SORPTION MECHANISM IS GAS-SOLID ADSORPTION. MORE RECENTLY, THESE SORBENTS HAVE BEEN USED IN SOURCE SAMPLING AT TEMPERATURES WHICH CAUSE THE CONDENSATION OF SIGNIFICANT AMOUNTS OF WATER. THIS REDUCES THE PROBABILITY OF ACID-POLYMER MECHANISM. IN THE WORK PROPOSED BOTH DYNAMIC (LIQUID CHROMATOGRAPHY) AND STATIC METHODS WILL BE EXAMINED AS METHODS FOR THE LABORATORY MEASUREMENT OF SORPTION CAPACITY AND SELECTIVITY AS A FUNCTION OF PH AND TEMPERATURE. IN ADDITION, THE RELATION BETWEEN WATER-BENZENE DISTRIBUTION AND WATER-STYRENE POLYMER (XAD-2) ADSORPTION WILL BE EXAMINED. INFORMATION OBTAINED FROM LITERATURE VALUES FOR BENZENE-WATER-SOLUTE SYSTEMS AND LABORATORY-MEASURED POLYMER STUDIES WILL BE USED TO ATTEMPT TO DEVELOP A PREDICTIVE MODEL FOR SAMPLING PURPOSES. OUTPUT: FINAL REPORT TO BE ENTERED INTO ORD SYSTEM. OF DIRECT USE TO IERL BUT ALSO OF INTEREST TO SCIENTIFIC COMMUNITY.

II-531

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DEVELOPMENT OF A WATER QUALITY MODEL FOR FEEDLOT RUNOFF CONTROL SYSTEMS

  START/ COMPL DATE :    09/77 - 09/80 : FUNDING : EST. - FY   77  / $   74659
   TASK/EPA CODE :L6170-27     / R805499-01  (GRANT)  PRIOR  FY   /          1
  PROJECT OFFICER : R D  KREIS
  INVESTIGATORS :    J K KOELLIKER                      OREGON STATE HIGHER EDUC, SYS
                     J R MINER                          OREGON STATE HIGHER EDUC, SYS
                     R B WENSINK                        OREGON STATE HIGHER EDUC. SYS
  MILE: 09/77 -INITIATE PROJECT
        01/78 -PRELIMINARY MODEL DESIGN
        06/78 -FIRST VERSION MODEL VERIFIED
        12/79 -SECOND VERSION MODEL VERIFIED
        05/80 -FINAL REPORT COMPLETE
   THE OBJECTIVE IS TO DEVELOP A CONTINUOUS WATER QUALITY MODEL TO PREDICT,
   ON A DAILY BASIS, THE QUALITY OF FEEDLOT RUNOFF CONTAINED IN THE
   RUNOFF RETENTION BASIN, DISCHARGED BY UNCONTROLLED EVENTS, AND DEPOSITED
    ON THE INTERCEPTION SURFACE OF THE LAND TREATMENT AREA. PREDICTION EQU
   ATIONS FOR COD, NH3-N, TOTAL N [illegible]DS, TOTAL P, MICROORGANISMS, AND PH BASED
   UPON PREVIOUSLY REPORTED RESEARCH WILL BE ADDED TO A HYDROLOGIC MOD
   EL DEVELOPED BY THE INVESTIGATORS. INTENSIVE SAMPLING OF A RETENTION BASIN
    WILL BE DONE TO PROVIDE INPUT TO CALIBRATE THE QUALITY MODEL. FIELD DATA
   WILL ALSO BE COLLECTED DURING SPRAY IRRIGATION TO DETERMINE QUALITY
   CHANGES. SUBSEQUENTLY, SAMPLING OF FIVE OTHER BASINS WILL BE MADE TO FIELD
    TEST AND FURTHER AID IN REFINING THE WATER QUALITY MODEL FOR EACH CONS
   TITUENT. FIELD WORK AND DEVELOPMENT WILL BEGIN IN AUGUST 1977. THE INITIAL
    MODEL WILL BE OPERATIONAL ABOUT FEBRUARY 1978, INITIAL CALIBRATION WILL
   BE FINISHED ABOUT SEPTEMBER 1977.
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II-532

AIRCRAFT RADIATION MEASUREMENTS OVER ST. LOUIS

START/ COMPL DATE :   09/77 - 09/78 : FUNDING : EST. - FY   77 / $ 16000
TASK/EPA CODE :G603A-AA-36 / R805500-01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER : F S BINKOWSKI
INVESTIGATORS :   T N CARLSON   PENN. STATE UNIVERSITY
MILE: 07/78 -FINAL REPORT

AIRCRAFT RADIATION MEASUREMENTS MADE ON BOARD THE PENN STATE AEROCOMMANDER DURING THE 1976 AND 1974 ST. LOUIS RAPS PROJECT WILL BE PROCESSED AND THE DATA REDUCED FOR THE PURPOSES OF ASSESSING THE EFFECTS OF AEROSOLS IN THE URBAN BOUNDARY LAYER ON TRANSMISSION AND FOR TESTING OF RADIATIVE TRANSFER MODELS.

II-533

A SURVEY OF THE USE AND EMISSION OF SELECTED CARCINOGENS IN NEW JERSEY

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   START/ COMPL DATE :    10/77 - 10/80 : FUNDING : EST. - FY   77  / $   55000
    TASK/EPA CODE :F624A-077    / R805501-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : J A  MCSORLEY
   INVESTIGATORS :    P W PREUSS                      STATE DEPT. OF ENV. PROTECTIO
   MILE: 09/77 -GRANT AWARD
        09/80 -GRANT COMPLETION
     OBJECTIVES OF THE PROJECT: 1. TO ESTABLISH A COMPUTERIZED DATA BASE CON
     CERNING THE MANUFACTURE, USE, STORAGE, PROCESSING, FORMATION, RELEASE, DIS
     POSAL AND REPACKAGING IN NJ OF A GROUP OF CARCINOGENIC SUBSTANCES SELECTED
     ON THE BASIS OF THEIR LARGE VOLUME OF PRODUCTION AND/OR THEIR CARCINOGE
     NICITY. 2. TO IDENTIFY THE AREA OF THE STATE AND POPULATION GROUP THAT ARE
     SUBJECT TO AN INCREASED CANCER RISK DUE TO EXPOSURE TO CANCER CAUSING SU
     BSTANCES AND OTHER TOXIC AGENTS IN THE ENVIRONMENT. 3. TO ESTABLISH A BASE
     FOR THE STUDY OF METHODS OF REDUCING OR ELIMINATING THE RELEASE OF CAR
     CINOGENS INTO THE ENVIRONMENT. THE DATA BASE WILL PERMIT DETERMINATIONS OF
      THE FOLLOWING: A. A COMPREHENSIVE INVENTORY OF THE SELECTED CARCINOGENS I
     N NEW JERSEY; B. THE INDUSTRIAL LOCATIONS WHERE THE SELECTED CARCINOGENS A
     RE USED, MANUFACTURED, STORED, RELEASED, FORMED, REPACKAGED, ETC., AND THE
      QUANTITY OF THE CARCINOGEN HANDLED AT EACH LOCATION; C. THE PRODUCTS WH
     ICH ARE MANUFACTURED FROM THE SELECTED CARCINOGENS; D. THE QUANTITY OF THE
      SUBSTANCES EMITTED AND/OR RELEASED TO THE ATMOSPHERE, WATER AND SOLID
     WASTE STREAM; E. THE POTENTIAL OCCUPATIONAL AND COMMUNITY EXPOSURE TO THE
     SELECTED MATERIALS.
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COLOR REMOVAL FROM NSSC EFFLUENTS BY ULTRAFILTRATION

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START/ COMPL DATE :    09/77 - 06/78 : FUNDING : EST. - FY   77  / $   25000
 TASK/EPA CODE :B610B-629    / R805502-01  (GRANT)  PRIOR  FY76 /         1
PROJECT OFFICER : R    SCOTT
INVESTIGATORS :   M    DOSHI                    INST. OF PAPER CHEMISTRY
                  H S DUGAL                     INST. OF PAPER CHEMISTRY
                  P E PARKER                    INST. OF PAPER CHEMISTRY
MILE: 08/77 -FUNDING PACKAGE SUBMITTED
      08/77 -AWARD FUNDS FOR PROJECT
      06/78 -FINAL REPORT RECEIVED
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THE PRIMARY OBJECTIVE OF THIS PROJECT IS TO DETERMINE WHETHER OR NOT ULTRAFILTRATION CAN BE USED AS A COLOR REMOVING TOOL FROM NSSC EFFLUENTS. THE SECONDARY OBJECTIVE WILL BE TO DEFINE FUTURE WORK IN THE AREA OF COLOR REMOVAL TECHNOLOGY. INDIVIDUAL STREAM(S) IN A SELECTED NSSC MILL WILL BE CHOSEN FOR THIS STUDY. ULTRAFILTRATION TUBULAR MODULAR DESIGN WILL BE USED AT HIGH VELOCITIES TO PREVENT GEL FORMATION AND SUSPENDED SOLIDS PLUGGING. LABORATORY EXPERIMENTS WILL BE DONE TO DETERMINE FLUX RATES AND COLOR REJECTIONS AS A FUNCTION OF CONCENTRATION, TIME, APPLIED PRESSURE, AND AVERAGE VELOCITY THROUGH THE MODULE. SAMPLES WILL BE ANALYZED FOR COLOR, BOD5, TOC, CARBOHYDRATES AND LIGNIN. LIMITED ANALYSIS FOR POTENTIAL TOXICANTS WILL ALSO BE CARRIED OUT BEFORE AND AFTER ULTRAFILTRATION. A FINAL REPORT WILL BE ISSUED DETAILING PROJECT FINDINGS. IF SO INDICATED, THE BENCH-SCALE RESEARCH PROJECT WILL BE MOVED TO A MILL SITE FOR ADDITIONAL ON SITE RESEARCH DEPENDENT ON AVAILABILITY OF FUNDS AT THIS POINT IN TIME.

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LAKE VANCOUVER, WASHINGTON - SOCIAL IMPLICATIONS OF A LAKE RESTORATION
PROGRAM
   START/ COMPL DATE :    08/77 - 09/79 : FUNDING : EST. - FY   77  / $   87901
    TASK/EPA CODE :M412A-34     / R805510-01  (GRANT)  PRIOR  FY   /           1
   PROJECT OFFICER : E F  MACDONALD
   INVESTIGATORS :    T C HOGG                          OREGON STATE HIGHER EDUC, SYS
                      W D HONEY                         OREGON STATE HIGHER EDUC, SYS
     LAKE VANCOUVER IS A EUTROPHIC URBAN LAKE IN CLARK COUNTY, WASHINGTON, WHI
     CH IS PRESENTLY UNDERGOING RESTORATION, THE OBJECTIVES OF THIS RESTORATION
      ARE THE CONTROL OF NON-POINT POLLUTION IMPROVEMENTS IN ITS AESTHETIC QUA
     LITIES AND THE PROVISION OF RECREATIONAL BENEFITS, THE SOCIAL IMPLICATIONS
     OF RESTORING LAKE VANCOUVER HAVE NOT BEEN DETERMINED, THE OBJECTIVE OF
     THIS RESEARCH IS TO WHOLISTICALLY EXAMINE THE RANGE AND TYPE OF
      SOCIAL IMPACTS THAT MAY BE GENERATED BY OR ASSOCIATED WITH THE RE
     STORATION PROCESS, IN ADDITION, THE RESEARCH EFFORT WILL TEST AND REFINE A
     RESEARCH MODEL PREVIOUSLY DESIGNED BY THE PRINCIPAL INVESTIGATORS FOR THE
     ENVIRONMENTAL PROTECTION AGENCY, THE RESEARCH APPROACH IS ADAPTED FROM
     THIS MODEL AND EMPLOYS PARTICIPANT OBSERVATION AS WELL AS SOCIAL SURVEY
      AS METHODS OF DATA COLLECTION, AN INTEGRAL PORTION OF THE RESEARCH DESIGN
      IS A CULTURAL-ECOLOGICAL FRAMEWORK WHICH ILLUSTRATES THE ABILITY
     OF HUMAN POPULATIONS TO ADAPT TO THE PRESENCE OF RESOURCE DEVELOPMENTS.
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AN ASSESSMENT OF THE RELATIONSHIP BETWEEN CANCER MORTALITY AND
POPULATION EXPOSURE TO SELECTED ENVIRONMENTAL AND INDUSTRIAL
START/ COMPL DATE : 11/77 - 00/00 : FUNDING : EST. - FY 77 / $ 73000
TASK/EPA CODE :H601F-7754 / R805526-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : K N ELSON
INVESTIGATORS : P W PREUSS STATE DEPT. OF ENV. PROTECTIO
G PAULSON STATE DEPT. OF ENV. PROTECTIO
T BURKE STATE DEPT. OF ENV. PROTECTIO
W COHEN STATE DEPT. OF ENV. PROTECTIO
MILE: 10/77 -AWARD GRANT
10/78 -FINAL REPORT DUE

THE PROPOSED PROJECT WILL CORRELATE THE GEOGRAPHIC PATTERNS OF CANCER MORTALITY WITH ENVIRONMENTAL AND INDUSTRIAL DATA IN THE FOLLOWING MANNER: A. STATEWIDE ENVIRONMENTAL AND INDUSTRIAL DATA WILL BE COLLECTED FOR AS FAR BACK IN TIME AS THE SOURCES PERMIT. B. A LIST OF APPROXIMATELY 600 ENVIRONMENTAL AND INDUSTRIAL VARIABLES WILL BE IDENTIFIED TO BE CORRELATED TO THE CANCER MORTALITY DATA. C. THESE VARIABLES WILL BE CORRELATED WITH THE CANCER MORTALITY DATA. THE MATHEMATICAL TECHNIQUES WILL INCLUDE BIVARIATE CORRELATION AND FACTOR ANALYSIS. BIVARIATE CORRELATION IS A STATISTICAL TOOL FOR MEASURING THE RELATIONSHIP BETWEEN TWO VARIABLES. FACTOR ANALYSIS PROVIDES A MEASURE OF THE EXTENT TO WHICH GROUPS OF DIFFERENT VARIABLES CORRELATE. THROUGH THE USE OF THESE TECHNIQUES, BOTH INDIVIDUAL AND GROUPS OF FACTORS WHICH CORRELATE WITH CANCER MORTALITY WILL BE IDENTIFIED. D. FROM THE RESULTS OF THE CORRELATION OF THE 600 VARIABLES, A LIST OF THOSE 20 TO 40 WHICH CORRELATE MOST STRONGLY WITH CANCER MORTALITY WILL BE GENERATED. E. INTENSIVE DATA SEARCHES WILL BE CONDUCTED IN ORDER TO RECONSTRUCT A 30-YEAR PERIOD OF POPULATION EXPOSURE TO THE 20 TO 40 SELECTED VARIABLES. F. ANNUAL EXPOSURE RATES WILL THEN BE CORRELATED TO ANNUAL MORTALITY DATA TO DETERMINE IF RELATIONSHIPS EXIST BETWEEN EXPOSURE AND MORTALITY. IN PERFORMING THESE CORRELATIONS THE 20-30 YEAR LATENCY PERIOD FOR CANCER WILL BE CONSIDERED. G. A FINAL REPORT WILL BE PREPARED EXPLAINING ALL FINDINGS AND RECOMMENDING FUTURE COURSES OF ACTION.

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ON-FARM IMPROVEMENTS TO REDUCE SEDIMENT AND NUTRIENTS IN IRRIGATION
RETURN FLOW
   START/ COMPL DATE :    10/77 - 03/81 : FUNDING : EST. - FY   77  / $  287703
    TASK/EPA CODE :L617A-07     / R805527-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : J P  LAW
   INVESTIGATORS :    L G KING                     WASHINGTON STATE UNIVERSITY
                      B L MCNEAL                   WASHINGTON STATE UNIVERSITY
                      W H PIETSCH                  WASHINGTON STATE UNIVERSITY
                      S   MATULICH                 WASHINGTON STATE UNIVERSITY
   MILE: 03/81 -FINAL REPORT
     THE OVERALL OBJECTIVES OF THIS PROJECT INCLUDE THE IMPLEMENTATION OF A
     PROGRAM FOR REDUCING THE NUTRIENT AND SEDIMENT DISCHARGES IN IRRIGATION
     RETURN FLOW FROM A WELL DEFINED SUB-BASIN OF APPROXIMATELY 2,000 A
     CRES. THE PROJECT IS INTENDED TO PROVIDE A FRAMEWORK FOR IMPLEMENTATION OF
      208 PLANS FOR IRRIGATED AGRICULTURE IN WASHINGTON. A HIGH DEGREE OF
     FARMER PARTICIPATION WILL BE OBTAINED BY PROVIDING COST SHARING FUNDS
     FOR CAPITAL IMPROVEMENTS ON INDIVIDUAL FARMS WITHIN THE SUB-BASIN. TECH
     NICAL HELP WILL BE PROVIDED FOR CHANGES OF PRACTICES NOT INVOLVING CAPITAL
      IMPROVEMENTS. THE REDUCTION IN NUTRIENTS AND SEDIMENTS AFFECTED
     BY SPECIFIC PRACTICE CHANGES WILL BE QUANTIFIED. THE BEST FARMING
     PRACTICES WILL BE IDENTIFIED ON A COST-EFFECTIVENESS BASIS. INFORMATION
     CONCERNING PROGRESS OF THE PROJECT WILL BE DISSEMINATED THROUGH COUNTY
     EXTENSION AGENTS, IRRIGATION AND CONSERVATION DISTRICTS, ANNUAL FIELD
     DAYS ON THE PROJECT SITE, PERIODIC AND FINAL REPORTS TO THE STATE OF
     WASHINGTON DEPARTMENT OF ECOLOGY AND THE U.S. ENVIRONMENTAL PROTECTIO
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A STUDY AND ANALYSIS OF THE MUNCIE, INDIANA INDUSTRIAL PRETREATMENT
PROGRAM
   START/ COMPL DATE :    08/77 - 08/79 : FUNDING : EST. - FY   77  / $   72500
    TASK/EPA CODE :L610F-21     / R805528-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : T E  SHORT
   INVESTIGATORS :   J   CRADDOCK                  MUNCIE CITY DIV. OF WATER QUA
   MILE: 09/77 -START PROJECT
         09/78 -COMPLETE PHASE I -ISSUE INTERIM REPORT
         09/79 -COMPLETE PROJECT - ISSUE FINAL REPORT
     THE OBJECTIVES OF THIS PROJECT ARE AS FOLLOWS: PROVIDE COMMUNITIES, INDUS
     TRIES, REGULATORY AGENCIES, CONSULTANTS, AND OTHER INTERESTED PARTIES WITH
     DESCRIPTIVE INFORMATION WHICH WOULD LEND GUIDANCE IN IMPLEMENTING INDU
     STRIAL WASTEWATER PRETREATMENT PROGRAMS. DETERMINE THE ABILITY OF EXISTING
     MUNCIE ACTIVATED SLUDGE TREATMENT FACILITY TO REMOVE OR ALTER THE
     CONCENTRATION OF SELECTED TOXIC COMPOUNDS. PROVIDE MUNCIE WITH TOXIC C
     OMPOUNDS DATA RELATIVE TO THE WASTEWATER TREATMENT PLANT INFLUENT AND EFFL
     UENT. THE COMPLETED PROJECT WILL INCLUDE A DESCRIPTION OF THE MUNCIE AREA,
      HISTORY OF THE PRETREATMENT PROGRAM, THE SEWER USE ORDINANCE, INDUSTRIAL
     MONITORING EFFORT, USER SURCHARGE PROCESS, INDUSTRIAL COST RECOVERY P
     ROVISION, SLUDGE APPLICATION PROGRAM, INSTITUTIONAL FACTORS, ADMINISTRATIV
     E FACTORS, EFFECTS OF PRETREATMENT PROGRAM ON WASTEWATER, AND PRETREATMENT
      PROGRAM IMPACT ON INDUSTRY.
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II-539

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RETENTION AND TRANSFORMATIONS OF PHOSPHOROUS AND SELECTED PESTICIDES IN
SOILS AND SEDIMENTS
   START/ COMPL DATE :    10/77 - 09/80 : FUNDING : EST. - FY   77  / $  182949
    TASK/EPA CODE :K6178-417    / R805529-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : C N  SMITH
   INVESTIGATORS :   P S RAO                         STATE UNIVERSITY OF FLA. SYS.
                     J M DAVIDSON                    STATE UNIVERSITY OF FLA. SYS.
                     L T OUT                         STATE UNIVERSITY OF FLA. SYS.
                     J J STREET                      STATE UNIVERSITY OF FLA. SYS.
                     V E BERKHISER                   STATE UNIVERSITY OF FLA. SYS.
                     T L YUAN                        STATE UNIVERSITY OF FLA. SYS.
                     W B WHEELER                     STATE UNIVERSITY OF FLA. SYS.
                     P V RAO                         STATE UNIVERSITY OF FLA. SYS.
   MILE: 10/77 -START OF GRANT
         10/79 -FINAL REPORT
     THE PROPOSED RESEARCH PROJECT CONSISTS OF THREE MAJOR PARTS. THE FIRST
     PART IS TO CONDUCT AN EXHAUSTIVE LITERATURE SEARCH TO COMPILE A
     PRELIMINARY DATA BASE OF RETENTION AND TRANSFORMATION CHARACTERISTICS OF C
     OMMON PESTICIDES AND PHOSPHORUS COMPOUNDS IN SOILS. THE SECOND PART OF THE
      PROJECT DEALS WITH BASIC LABORATORY EXPERIMENTS TO MEASURE
     EQUILIBRIUM AND KINETIC ADSORPTION-DESORPTION AND BOUND RESIDUE
     FORMATION CHARACTERISTICS, NONSINGULARITY OR IRREVERSIBILITY
     IN ADSORPTION-DESORPTION PROCESSES, AS WELL AS MEASUREMENT OF TRANSFORMATI
     ON RATES UNDER CONTROLLED SOIL ENVIRONMENTAL CONDITIONS. THE THIRD PART OF
      THE PROJECT INVOLVES ROUTINE MEASUREMENTS OF ADSORPTION-DESORPTION
     ISOTHERMS AND TRANSFORMATION RATES OF A LARGE NUMBER OF COMMON PES
     TICIDES USING A BROAD SPECTRUM OF SOIL TYPES FROM THROUGHOUT THE UNITED ST
     ATES. THE DATA BASE GENERATED BY THE PROPOSED PROJECT WILL THEN BE USED IN
     DEVELOPING GENERAL MULTIPLE REGRESSION EQUATIONS THAT RELATE RETENTION AND
      TRANSFORMATION COEFFICIENTS TO FUNDAMENTAL SOIL PROPERTIES. SUCH RE
     LATIONSHIPS ARE URGENTLY NEEDED TO ESTIMATE MODEL INPUT PARAMETERS FOR THE
     NONPOINT SOURCE POLLUTION SIMULATION MODELS (SUCH AS EPA'S AGRICULTURAL
     RUNOFF MANAGEMENT MODEL, ARM) CURRENTLY USED TO IDENTIFY AND RECOMMEND
     SOIL CONSERVATION AND LAND USE MANAGEMENT PRACTICES CAUSING MINIMUM E
     NVIRONMENTAL CONTAMINATION. A MULTI-DISCIPLINARY TEAM OF RESEARCHERS (SOIL
     PHYSICS, SOIL CHEMISTRY, SOIL MICROBIOLOGY, PESTICIDE CHEMISTRY,
     AND STATISTICS) HAS BEEN ASSEMBLED TO ACCOMPLISH THE SPECIFIED PROJECT
     GOALS. THE FINAL REPORT WILL BE PREPARED AT THE END OF THE PROJECT.
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II-540

DESIGN AND MANAGEMENT OF SUBSURFACE SOIL ABSORPTION SYSTEMS

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START/ COMPL DATE :    09/77 - 09/79 : FUNDING : EST, - FY   77  / $  180651
 TASK/EPA CODE :C611B-7133   / R805531-01  (GRANT)  PRIOR  FY   /         1
PROJECT OFFICER : J F  KREISSL
INVESTIGATORS :   W C BOYLE                        UNIV, OF WISCONSIN
                  B J TYLER                        UNIV, OF WISCONSIN
                  J   CONVERSE                     UNIV, OF WISCONSIN
                  R   OTIS                         UNIV, OF WISCONSIN
                  R   SIEGRIST                     UNIV, OF WISCONSIN
MILE: 10/77 -START
      10/78 -INTERIM REPORT
      10/79 -COMPLETE
      02/80 -PUBLISH
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THIS PROJECT HAS BEEN DIVIDED INTO THREE MAJOR AREAS OF RESEARCH: (1) A FIELD STUDY OF MODIFIED SUBSURFACE SYSTEMS, (2) AN EXAMINATION OF THE EFFECTS OF SOIL ABSORPTION FIELD CONSTRUCTION ON SOIL PERMEABILITY, AND (3) AN EVALUATION OF THE ACCEPTABILITY OF GRAYWATER IN BOTH STRUCTURED AND UNSTRUCTURED SOILS, IN THIS STUDY OF MODIFIED SUBSURFACE SYSTEMS, FIELD INSTALLATIONS ON TWO DIFFERENT SOIL TYPES WILL BE CONSTRUCTED TO COMPARE THE EFFECTS OF ALTERNATING BEDS VS, CONVENTIONAL BED OPERATION; TO COMPARE THE EFFECTS OF UNIFORM DISTRIBUTION VS, CONVENTIONAL GRAVITY DISTRIBUTION; AND TO COMPARE THE EFFECTS OF CHEMICAL OXIDATION VS, BIOLOGICAL OXIDATION ON RESTORATION OF INFILTRATIVE SITES, THE CONSTRUCTION STUDY WILL BE CONDUCTED TO DETERMINE THE EFFECTS OF CONSTRUCTION ON THE RESISTANCE OF THE INFILTRATIVE SURFACE UNDER DIFFERENT MOISTURE CONDITIONS IN SELECTED SOILS; TO DETERMINE BEST CONSTRUCTION TECHNIQUES TO MAINTAIN THE INFILTRATIVE SURFACE; AND TO DETERMINE WHAT TECHNIQUES MIGHT BE EMPLOYED TO RESTORE SOIL TO A HIGHER INFILTRATIVE CAPACITY AFTER BEING PUDDLED OR COMPACTED, THE GRAYWATER STUDY WILL EVALUATE THE RELATIVE ACCEPTABILITY OF GRAYWATER VS, WHOLE WASTEWATER IN BOTH STRUCTURED AND UNSTRUCTURED SOILS THROUGH THE USE OF LYSIMETERS IN THE FIELD AND COLUMNS IN THE LABORATORY,

II-541

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CHEMICAL REACTIONS OF ATMOSPHERIC HALOGENATED SPECIES

   START/ COMPL DATE :     08/77 - 08/78 : FUNDING : EST. - FY   77  / $   84770
    TASK/EPA CODE :G603A-AI-07  / R805532-01  (GRANT)  PRIOR  FY   /           1
   PROJECT OFFICER : P    HANST
   INVESTIGATORS :   M J MOLINA                    UNIV. OF CALIFORNIA
                     F S ROWLAND                   UNIV. OF CALIFORNIA
                     L T MOLINA                    UNIV. OF CALIFORNIA
                     R S IYER                      UNIV. OF CALIFORNIA
   MILE: 10/77 -ANNUAL REPORT
         10/78 -ANNUAL REPORT
         10/79 -FINAL REPORT
     THE PURPOSE OF THIS RESEARCH IS THE UNDERSTANDING OF THE VARIOUS
     ATMOSPHERIC CHEMICAL AND PHOTOCHEMICAL REACTION INVOLVING HALOGENATED
     SPECIES. THESE INCLUDE THE HALOCARBON COMPOUNDS IN CURRENT TECHNOLOGY,
     THE INTERMEDIATE HALOGENATED RADICALS RELEASED DURING THEIR ATMOSPHERIC
      DECOMPOSITION, AND COMPOUNDS FORMED IN SITU BY ATMOSPHERIC REACTIONS.
      THE ULTRAVIOLET ABSORPTION SPECTRA OF BROMINATED MOLECULES OFTEN
     EXTEND INTO THE 2900-3100A REGION NEAR THE ATMOSPHERIC CUT-OFF OF S
     TRATOSPHERIC OZONE. LONG-PATH U.V. ABSORPTION SPECTRA WILL BE MEASURED FOR
     VARIOUS BROMINATED SPECIES (E.G. CBR2F2) TO DETERMINE WHICH MOLECULES CAN
      UNDERGO APPRECIABLE TROPOSPHERIC SOLAR PHOTODECOMPOSITION. THE CHEMICAL
     REACTION MECHANISMS OF IMPORTANT "SEMI-STABLE" MOLECULES FORMED IN THE
      ATMOSPHERE WILL BE STUDIED. FLASH PHOTOLYSIS WILL BE USED TO DETERMINE
     WHETHER THE HALOGENATED SPECIES RELEASED IN THE PHOTODECOMPOSITION OF
     CHLORINE NITRATE IS C1O, CLONO, CL OR CLNO. FLASH PHOTOLYSIS WILL BE USED
      TO DETERMINE WHETHER CLONO2 IS THE SOLE PRODUCT FROM THE REACTION
     OF CLO WITH NO2. PEROXYNITRIC ACID (HO2NO2) WILL BE SYNTHESIZED AND ITS
     U.V. ABSORPTION SPECTRUM WILL BE MEASURED. RADIOACTIVE TRACER TECHNIQUES
     WILL BE APPLIED TO THE DETERMINATION OF THE CHEMICAL FATE OF HAL
     OGENATED RADICALS REACTING WITH AIR. THESE TRACER RADICALS CAN EFFECTIVELY
     SIMULATE THE VERY LOW CONCENTRATIONS OF ORGANIC SPECIES IN THE ACTUAL AT
     MOSPHERE. THE POSSIBLE FORMATION OF ALDEHYDES FROM THE OXIDATION OF HALO R
     ADICALS WILL BE INVESTIGATED, E.G. FOR CH3CCL3, THE FORMATION OF 14CH3CCLO
     FROM 14CH3CCL2 PLUS O2. THE REACTIONS OF THE RESIDUAL RADICALS FROM
     CH3BR DECOMPOSITION WILL BE TRACED USING RADIOACTIVELY-LABELED CH282BR.
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ENVIRONMENTAL MONITORING OF A WASTEWATER TREATMENT PLANT

START/ COMPL DATE : 10/77 - 10/78 : FUNDING : EST. - FY 77 / $ 59684
TASK/EPA CODE :D607A-008 / R805533-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : H R PAHREN

INVESTIGATORS :	D E JOHNSON	SOUTHWEST RESEARCH INSTITUTE
	J W REGISTER	SOUTHWEST RESEARCH INSTITUTE
	H J HARDING	SOUTHWEST RESEARCH INSTITUTE
	B P SAGIK	UNIV. OF TEXAS
	C A SORBER	UNIV. OF TEXAS

MILE: 10/77 -BEGIN PROJECT
09/78 -COMPLETE PROJECT

OBJECTIVES: TO EXAMINE THE AMBIENT AIR IMMEDIATELY DOWNWIND OF A WASTEWATER TREATMENT PLANT FOR THE PRESENCE OF PATHOGENIC MICROORGANISMS. EXAMINATIONS OF THE WASTEWATER AT SEVERAL POINTS WITHIN THE PLANT WILL ALSO BE MADE. DETERMINATIONS OF WHETHER OR NOT THESE MICROORGANISMS ARE CARRIED INTO POPULATED AREAS NEAR THE PLANT WILL BE PERFORMED. APPORACH: THE STUDY WILL BE INITIATED BY A VISIT TO THE SITE TO ESTABLISH THE REQUIRED LIAISON WITH THE APPROPRIATE STAFF OF THE PROPOSED TREATMENT PLANT LOCAL SCHOOLS AND RESIDENTS, AFTER WHICH SEVERAL LARGE VOLUME SAMPLES OF WASTEWATER WILL BE COLLECTED AND TRANSPORTED TO LABORATORIES IN SAN ANTONIO WHERE THEY WILL BE ANALYZED FOR VIRUSES AND ENTERIC BACTERIA TO CHARACTERIZE THE WASTEWATER FOR LEVELS AND TYPES OF PATHOGENIC MICROORGANISMS. FROM THE PREDOMINATE PATHOGENIC MICROORGANISMS, SEVERAL WILL BE SELECTED FOR MONITORING IN WASTEWATER AND AEROSOL SAMPLES. FOLLOWING COMPLETION OF THESE ANALYSES, THE FINAL DESIGN OF THE MONITORING PROGRAM WILL BE COMPLETED. IN GENERAL, THE MONITORING EFFECT IS EXPECTED TO BE ACCOMPLISHED OVER A THREE-WEEK TIME PERIOD, DURING WHICH TIME SEVERAL AEROSOL RUNS COMPRISED OF ONE UPWIND AND 5 DOWNWIND STATIONS, TOGETHER WITH A COMPOSITE WASTEWATER SAMPLE COLLECTED DURING EACH AEROSOL RUN, WILL BE CARRIED OUT. AEROSOL SAMPLES WILL BE COLLECTED USING HIGH-VOLUME ELECTROSTATIC SAMPLERS (LITTON MODEL M OR LEAP TYPES). WIND SPEED AND DIRECTION WILL BE MONITORED WITH 2-METER AND 10-METER METEOROLOGY WEATHER STATIONS. PROGRESS: A PRELIMINARY VISIT HAS BEEN MADE TO A WASTEWATER TREATMENT PLANT LOCATED NEAR PORTLAND, OREGON, TO ESTABLISH CONTACTS WITH LOCAL PLANT AND SCHOOL OFFICIALS.

II-543

MEASUREMENT OF VOLATILE CHEMICAL EMISSIONS FROM WASTEWATER BASINS

START/ COMPL DATE :   08/77 - 10/79 : FUNDING : EST. - FY   77 / $ 94000
TASK/EPA CODE :56048-618   / R805534-01 (GRANT) PRIOR FY76 /   1
PROJECT OFFICER : V   DALLONS
INVESTIGATORS :   L J THIBODEAUX   UNIV. OF ARKANSAS
                   D G PARKER   UNIV. OF ARKANSAS

MILE: 08/77 -FUNDING PACKAGE SUBMITTED
10/77 -AWARD FUNDS FOR PROJECT
08/79 -FINAL DRAFT REPORT
10/79 -FINAL REPORT RECEIVED

OBJECTIVE: THE OBJECTIVE OF THIS STUDY IS TO DETERMINE THE MAGNITUDE OF BOTH SULFUR AND ORGANIC COMPOUNDS THAT ESCAPE INTO THE AIR FROM WASTEWATER TREATMENT FACILITIES AT PULP AND PAPER MILLS. THE RESULTS OF THIS STUDY WILL HELP TO ESTABLISH WHETHER WASTEWATER TREATMENT FACILITIES ARE A SIGNIFICANT SECONDARY EMISSION SOURCE OF SULFUR AND ORGANIC COMPOUNDS. THE RESULTS CAN ALSO BE USED TO ESTABLISH BASELINE QUANTITIES AND TO SUGGEST POSSIBLE CONTROL METHODS, IF REQUIRED. METHODS: BOTH LABORATORY AND FIELD INVESTIGATIONS WILL BE CONDUCTED. THE LABORATORY STUDY WILL BE DESIGNED PRIMARILY TO PERFECT APPROPRIATE WATER AND AIR SAMPLING TECHNIQUES. THIS PHASE WILL CONSIST OF RUNNING A LABORATORY SCALE BIOLOGICAL REACTOR AND SAMPLING BOTH THE LIQUID AND AIR PHASES. THE METHODS DEVELOPED DURING THIS STUDY WILL THEN BE USED TO CONDUCT FIELD INVESTIGATIONS. BOTH PHASES OF THIS PROJECT WILL TAKE APPROXIMATELY ONE YEAR TO COMPLETE. THE FIELD SAMPLING WILL CONSIST OF BOTH WATER AND AIR SAMPLING AT ACTUAL WASTEWATER TREATMENT FACILITIES. LIQUID SAMPLES WILL BE COLLECTED AT THE INFLUENT AND EFFLUENT LOCATIONS OF THE TREATMENT REACTORS AS WELL AS IN THE REACTORS THEMSELVES. AIR SAMPLES WILL BE COLLECTED AT STRATEGIC POINTS UPWIND AND DOWNWIND FROM THE BIOLOGICAL REACTORS AND POSSIBLY ABOVE THE REACTORS THEMSELVES. AIR SAMPLES WILL BE COLLECTED AT DIFFERENT ELEVATIONS SO THAT THE VERTICAL DISTRIBUTION OF POLLUTANTS CAN BE ESTABLISHED. THE RESULTS WILL BE PUBLISHED IN EPA TECHNICAL REPORT SERIES.

II-544

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EVALUATION OF THE ACCURACY AND VALIDITY OF PHYSICO-CHEMICAL AIR QUALITY
MODELS
   START/ COMPL DATE :    09/77 - 09/79 : FUNDING : EST. - FY   77  / $  110180
    TASK/EPA CODE :G603A-AH-36  / R805537-01  (GRANT)  PRIOR  FY   /           1
   PROJECT OFFICER : K     DEMERJIAN
   INVESTIGATORS :   J H SEINFELD                      CALIF. INST. OF TECHNOLOGY
   MILE: 09/78 -FINAL REPORT
     PHYSICO-CHEMICAL AIR QUALITY MODELS DESCRIBE ATMOSPHERIC POLLUTANT B
     EHAVIOR BASED UN FUNDAMENTAL ASPECTS OF ATMOSPHERIC CHEMISTRY AND PHYSICS.
     THE OBJECT OF THIS RESEARCH PROGRAM IS TO DEVELOP TECHNIQUES FOR ASSES
     SING THE ACCURACY AND VALIDITY OF PHYSICO-CHEMICAL AIR QUALITY MODELS. THE
      PROGRAM WILL CONSIST OF TWO PARTS: 1. TO DETERMINE THE RANGE OF
     VARIABILITY OF KEY PARAMETERS IN PHYSICO-CHEMICAL AIR QUALITY MODELS AND
     THEN TO ESTABLISH THE RANGE OF VARIABILITY OF THE CONCENTRATION PR
     EDICTIONS OF SUCH MODELS. 2. TO DEVELOP A CONSISTENT AND GENERAL FRAMEWORK
     FOR EVALUATING THE PERFORMANCE OF MODELS WITH RESPECT TO THE DEGREE
     TO WHICH THEIR PREDICTIONS MATCH AMBIENT POLLUTANT CONCENTRATION DATA.
     THE RESULT OF THE RESEARCH WILL BE A GENERAL FRAMEWORK FOR ASSESSING QUA
     NTITATIVELY THE ACCURACY AND VALIDITY OF PHYSICO-CHEMICAL AIR QUALITY MODE
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805538

II-545

OBJECTIVE: The principal objective of the Fourth National Conference on Individual Onsite Wastewater Systems is to continue an established forum for communication between professionals concerned with application and management of onsite wastewater systems. These professionals include engineers and sanitarians responsible for regulation, planners, and attorneys. Manufacturers of conventional as well as the technologically advanced wastewater recycle and water conservation systems, land developers and other users are expected to participate in conference activities.

APPROACH: This the Fourth National Conference organized by NSF to provide for exchange of information between regulatory, manufacturing, and consumer interests concerned with the treatment and disposal of wastes from individual homes. Federal, state, and local responsibilities will be reviewed. Particular emphasis will be placed on presenting effective management plans implemented by state and local agencies to insure the continued workability and adequate maintenance of all onsite systems. In view of EPA's position with respective to considering onsite systems as practical, cost effective alternatives to central sewerage systems in complying with PL 92-500 requirements for areawide wastewater management planning (Section 208), this year's conference is particularly timely.

CURRENT PLANS OR PROGRESS: Arrangements for a meeting of the planning committee on June 15, 1977, have been completed. Representatives of professional organizations with concern for onsite treatment alternatives; federal, state, and local regulatory agencies; researchers; and manufacturers have been invited to plan the Fourth National Conference.

805540

II-546

By this study we aim to identify categories of persons at high risk for development of cutaneous malignant melanoma and to isolate behavior patterns which increase the risk of tumor development. The approach utilizes case control techniques including the administration of a detailed questionnaire to both melanoma patients and normal age-sex matched controls. To date preliminary data on 343 melanoma patients compared to 150 controls suggest that melanoma patients sunburn more easily and suntan less well. An indepth exploration of solar exposure patterns and other environmental/occupation exposures is planned.

II-547

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1978 EPA/SHWRD HAZARDOUS WASTE RESEARCH SYMPOSIUM

   START/ COMPL DATE :    08/77 - 07/78 : FUNDING : EST, - FY   77  / $   30606
    TASK/EPA CODE :C618A-7040   / R805544-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R E  LANDRETH
   INVESTIGATORS :   D W SHULTZ                     SOUTHWEST RESEARCH INSTITUTE
   MILE: 07/77 -GRANT AWARDED
         08/78 -PROJECT COMPLETED
         10/78 -FINAL REPORT
     THE OBJECTIVES ARE TO PROVIDE THE FORUM FOR A STATE-OF-THE-ART REVIEW AND
     DISCUSSION OF CURRENT RESEARCH IN THE MANAGEMENT OF HAZARDOUS WASTES
     AND MAKE THIS INFORMATION AVAILABLE TO THE PUBLIC, THE APPROACH WILL BE
     TO BRING RESEARCH AND OTHER INTERESTED PERSONNEL FROM VARIOUS PARTS OF
     THIS AND OTHER COUNTRIES TO AN ATMOSPHERE CONDUCIVE TO FREE AND U
     NRESTRAINED DISCUSSIONS AND TO INTERCHANGE, INTERRELATE, AND CIRCULATE NEW
      INFORMATION THAT IS BEING GENERATED IN THE FIELD OF HAZARDOUS WASTE
     RESIDUALS MANAGEMENT,
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II-548

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CONFERENCE - ALTERNATIVES IN ANIMAL WASTE UTILIZATION

   START/ COMPL DATE :    07/77 - 07/78 : FUNDING : EST. - FY   77  / $    2000
    TASK/EPA CODE :L6170-22     / R805547-01  (GRANT)  PRIOR  FY    /          1
   PROJECT OFFICER : R D  KREIS
   INVESTIGATORS :    J P FONTENOT                       AMER. SOC. OF ANIMAL SCIENCE
                      C   CRUSE                          AMER. SOC. OF ANIMAL SCIENCE
   MILE: 07/77 -PROJECT FUNDED
         07/77 -SYMPOSIUM HELD
         06/78 -PROCEEDINGS PUBLISHED
     THE MAIN OBJECTIVE OF THE CONFERENCE IS TO EXAMINE IN DEPTH THE
     FEASIBILITY OF THE VARIOUS ALTERNATIVES IN UTILIZATION OF ANIMAL WASTES.
     PREVIOUS SYMPOSIA AND CONFERENCES HAVE COVERED ONLY ONE OF THE POTENTIAL
     USES OF THE WASTE. THE DIFFERENT ALTERNATIVES WILL BE CRITICALLY EVALUATED
      BY TOP SPECIALISTS IN THE VARIOUS DISCIPLINES. PUBLICATION OF THE
     DOCUMENTED PAPERS WILL PROVIDE REFERENCE MATERIAL WHICH IS NOT PRESENTLY
     AVAILABLE. A 1-DAY CONFERENCE WILL BE HELD AT THE ANNUAL MEETING OF THE
     AMERICAN SOCIETY OF ANIMAL SCIENCE, MADISON, WISCONSIN, JULY 27, 1977. THE
      CONFERENCE WILL CONSIST OF FORMAL PRESENTATIONS BY SPEAKERS WITH
     TIME FOR DISCUSSION AFTER EACH MAJOR SECTION. EACH SPEAKER WILL SUBMIT
      A MANUSCRIPT IN PROPER FORM FOR PUBLICATION IN THE JOURNAL OF ANIMAL SCI
     ENCE. THE PAPERS WILL BE REVIEWED BY THE EDITORIAL BOARD OF THE JOURNAL OF
      ANIMAL SCIENCE. FOLLOWING APPROPRIATE REVISIONS, THEY WILL BE PU
     BLISHED AS A GROUP IN ONE ISSUE OF THE JOURNAL. REPRINTS WILL BE AVAILABLE
      AND SEVERAL WILL BE SUPPLIED TO EPA.
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DENITRIFICATION AS AFFECTED BY IRRIGATION FREQUENCY OF A FIELD SOIL

START/ COMPL DATE : 09/77 - 06/79 : FUNDING : EST. - FY 77 / $ 97995
TASK/EPA CODE :L617A-08 / R805550-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : A G HORNSBY
INVESTIGATORS : D E ROLSTON UNIV. OF CALIFORNIA
MILE: 07/79 -FINAL REPORT

THE OBJECTIVES OF THIS PROJECT ARE TO: (A) DIRECTLY MEASURE FLUXES OF N_2 AND N_2O GASES FROM A FIELD SOIL AS INFLUENCED BY IRRIGATION FREQUENCY AND FERTILIZER SOURCE, (B) COMPARE DENITRIFICATION OBTAINED FROM N_2 AND N_2O GAS FLUXES WITH DENITRIFICATION OBTAINED BY DIFFERENCE, (C) EVALUATE EXISTING NITROGEN SIMULATION MODELS TO DETERMINE IF SUCH MODELS CAN SIMULATE THE DYNAMIC DENITRIFICATION PROCESS THAT OCCURS DURING AND AFTER A NORMAL IRRIGATION CYCLE, AND (D) EVALUATE NITRATE LEACHING TO THE GROUND WATER AS INFLUENCED BY IRRIGATION FREQUENCY. DENITRIFICATION WILL BE DETERMINED DIRECTLY FROM FIELD-MEASURED FLUXES OF N_2 AND N_2O GASES EVOLVED FROM FERTILIZER LABELED WITH ^{15}N. SOIL, GRASS, AND LEACHATE SAMPLES WILL BE ANALYZED TO DETERMINE THE AMOUNT OF N IMMOBILIZATION IN SOIL, PLANT UPTAKE, AND LEACHING LOSS, IN ORDER TO CALCULATE DENITRIFICATION BY DIFFERENCE. THE RESULTS OF THIS RESEARCH WILL BE USED TO DEVELOP FERTILIZER AND IRRIGATION MANAGEMENT PRACTICES FOR MAXIMAL FERTILIZER USE EFFICIENCY AND MINIMAL LEACHING OF NITRATE TO GROUND WA

II-550

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EPIDEMIOLOGICAL STUDY OF CANCER AS RELATED TO INDUSTRIAL EMISSIONS IN
HEAVILY INDUSTRIALIZED CONTRA COSTA COUNTY (ABBREV)
   START/ COMPL DATE :    11/77 - 11/79 : FUNDING : EST. - FY   77  / $  128000
    TASK/EPA CODE :H601F-7750    / R805551-01  (GRANT)  PRIOR  FY   /           1
   PROJECT OFFICER : -      KNELSON
   INVESTIGATORS :    D H WOOD                    CONTRA COSTA CO. HEALTH DEPT.
                      J R GOLDSMITH               STATE DEPT. OF HEALTH
                      D F AUSTIN                  STATE DEPT. OF HEALTH
                      M   FELDSTEIN               BAY AREA AIR POLL. CONT. DIST
                      F   HESSE                   CONTRA COSTA CO. HEALTH DEPT.
                      M   DEANE                   STATE DEPT. OF HEALTH
   MILE: 11/77 -AWARD GRANT
         11/78 -PROGRESS REPORT
         11/79 -FINAL REPORT
     STATEMENT OF MAJOR OBJECTIVES: PHASE I: ESTABLISH THE SITES AND TYPES OF
     CANCER FOR WHICH THE RATES DIFFER BETWEEN PREDOMINANTLY INDUSTRIAL AND
     PREDOMINALTY RESIDENTIAL PARTS OF CONTRA COSTA COUNTY. PHASE II: ESTABLISH
     THE RELATIONSHIP, IF ANY, BETWEEN SITE AND TYPE OF CANCER AS RELATED TO
      OCCUPATION FROM MORTALITY AND MORBIDITY DATA FOR THE YEARS 1974 THRU
     1976 IN THE HEAVILY INDUSTRIALIZED AND THE RESIDENTIAL PARTS OF
      THE COUNTY. PHASE III: PROVIDE SUPPORTIVE EVIDENCE OF THE RELATIONSHIP
     BETWEEN THE INCIDENCE OF SELECTED CANCER SITES VS. DESIGNED VARIABLES AND
      CONTROLS, THRU THE COMPREHENSIVE INTERVIEWING OF A CASE P
     OPULATION OF 1000 PATIENTS. PHASE IV: FINAL CONCLUSION AND WRITE-UP OF THE
     STUDY. MAJOR ACTIVITIES TOWARDS ACHIEVEMENT OF OBJECTIVES: PHASE I: COL
     LECTION OF 1969-74 DATA OF CANCER INCIDENCE FROM THE CALIF. TUMOR REGISTRY
     (CTR) FOR CONTRA COSTA CO.; COLLECTION OF DATA AND RESULTS OF INTER
     VIEWS OF THE 3RD NAT'L CANCER SURVEY FOR CONTRA COSTA CO.; ANALYSIS AND PR
     OCESSING OF DATA CORRELATING IT TO COUNTY CENSUS TRACT, AGE, SEX, RACE AND
     OTHER DEMOGRAPHIC CENSUS PARAMETERS AS RELATED TO CANCER SITE AND TYPE;
     WRITE-UP OF PHASE I REPORT. PHASE II: COLLECTION AND ANALYSIS OF HOSPITAL
     RECORDS AND DEATH CERTIFICATES FOR CANCER CASES FOR THE YEARS 1974-76;
     CORRELATING CANCER TYPE AND SITE WITH OCCUPATION AND OTHER VARIABLES. ANA
     LYZE AND PROCESS THE DATA AVAILABLE TO CORRELATE SITE AND TYPE OF CANCER A
     GAINST CENSUS TRACT, OCCUPATION, BIRTH PLACE AND OTHER VARIABLES; WRITE UP
      A FIELD REPORT CLARIFYING THE FINDINGS AND CONCLUSIONS OF THIS PHASE
     OF ACTIVITY. PHASE III: THE FIELD WORKERS WILL INTERVIEW 1000 CASES WITH
     SPECIFIC SELECTED SITES BASED ON FINDINGS OF PREVIOUS PHASE; THE COMPREH
     ENSIVE QUESTIONNAIRE WILL BE ADDRESSED TO CASES DIAGNOSED DURING THE YEARS
     1975-76; THE DATA COLLECTED WILL BE PROCESSED AND RELATED TO THE VARIAB
     LES AVAILABLE IN THE QUESTIONNAIRE FORM; AIR POLLUTION EMISSION PATTERNS W
     ILL BE ANALYZED; A FINAL REPORT WILL BE SUBMITTED AT THE END OF THIS PHASE
     ACHIEVING THE OBJECTIVES STATED EARLIER. PHASE IV: THE PROJECT
     DIRECTOR, IN COORDINATION WITH THE PROJECT STAFF, THE TECHNICAL ADVISORY
     COMM. AND OTHER CONSULTING AGENCIES OR INDIVIDUALS, WILL PREPARE THE FINAL
      AND COMPREHENSIVE WRITE-UP OF THE STUDY; SUBMIT SAME TO ALL CONCERNED
     AGENCIES; PREPARE SUMMARIES OF THE STUDY FOR DISTRIBUTION AND
     PUBLICATION.
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II-551

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REDUCTION OF POLLUTANT FORMATION IN COAL PARTICLE AND LIQUID FUEL SPRAY
FLAMES
   START/ COMPL DATE :    10/77 - 10/80 : FUNDING : EST, - FY   77  / $  200789
    TASK/EPA CODE :F624A-003     / R805552-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : G B  MARTIN
   INVESTIGATORS :        UNKNOWN                      MASS, INST, OF TECHNOLOGY
   MILE: 10/77 -INITIATE GRANT
         10/78 -IDENTIFY COAL AND OIL PYROLYSIS MECHANISMS
         10/80 -COMPLETE DOCUMENTATION
     THE OVERALL OBJECTIVE IS TO STUDY THE COMBUSTION OF SOLID AND LIQUID FUELS
      WITH PARTICULAR EMPHASIS ON NOX, PARTICULATE AND HETEROCYCLIC
     HYDROCARBON EMISSION, THE FACTORS IN PRACTICAL COMBUSTION SYSTEMS THAT
     INFLUENCE THE FORMATION AND EMISSION OF THESE POLLUTANTS ARE THE
      TIME-TEMPERATURE-CONCENTRATION HISTORY OF THE FUEL AND THE CHEMICAL
     COMPOSITION OF THE ENVIRONMENT, THE APPROACH IS TO SELECT CONDITIONS R
     EPRESENTATIVE OF THOSE IN INDUSTRIAL FLAMES AND FOLLOW THE TIME RESOLVED B
     EHAVIOR OF THE FUEL INCLUDING THE EVOLUTION OF NITROGEN BEARING COMPOUNDS,
     THEIR PYROLYSIS AND OXIDATION REACTIONS AND THE EMISSIONS OF CARBONA
     CEOUS SOLIDS AND OTHER POLLUTANTS, THE PROPOSED RESEARCH INVOLVES THE FOLL
     OWING PARALLEL AND SEQUENTIAL INVESTIGATIONS: A) EXPERIMENTS WITH PULVERIZ
     ED COAL PARTICLES AND MONOSIZE DROPLET STREAMS IN HIGH TEMPERATURE LAMINAR
      FLOW FURNACES TO DETERMINE THE TIME RESOLVED EVOLUTION AND C
     HEMICAL TRANSFORMATION OF FUEL-N COMPOUNDS, B) MONOSIZE DROPLET STREAM PYR
     OLYSIS AND COMBUSTION STUDIES IN WHICH OPTICAL DIAGNOSTICS WILL BE USED TO
     DETERMINE THE TEMPERATURE DISTRIBUTION AROUND THE REACTING DROPLETS IN A
     QUARTZ TUBE REACTOR, C) SPRAY PYROLYSIS STUDIES SIMULATING CONDITIONS
      IN THE FIRST STAGE OF STAGED COMBUSTION SYSTEMS IN WHICH THE FUEL-N EV
     OLUTION, THE REACTIONS OF NITROGENOUS COMPOUNDS AND THOSE LEADING TO THE F
     ORMATION OF CARBONACEOUS SOLIDS WILL BE STUDIED IN FUEL RICH ENVIRONMENTS,
      IT IS EXPECTED THAT RESULTS OF THESE BASIC STUDIES WILL ASSIST IN THE
     INTERPRETATION OF RESULTS OBTAINED IN PARAMETRIC INVESTIGATIONS AND THUS L
     EAD TO THE DEVELOPMENT OF CONTROL METHODS CAPABLE OF REDUCING NOX EMISSION
     FROM COAL AND HEAVY FUEL OIL FLAMES WITHOUT AN INCREASE IN THE EMISSION OF
     SOOT AND CARBONACEOUS PARTICULATES,
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II-552

GRADUATE RESEARCH IN AIR QUALITY METEOROLOGY

START/ COMPL DATE :   09/77 - 09/78 : FUNDING : EST. - FY   77 / $ 13500
TASK/EPA CODE :G603A-AB-39 / R805554-01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER : L E NIEMEYER
INVESTIGATORS :   W J SAUCIER   UNIV. OF NORTH CAROLINA
                  G F WATSON   UNIV. OF NORTH CAROLINA
                  T L TSUI   UNIV. OF NORTH CAROLINA
MILE: 08/78 -ANNUAL PROGRESS REPORT

THE PRINCIPAL OBJECTIVE, BEING BASED ON THE QUALIFICATIONS AND INTERESTS OF THE RESEARCH GROUP AND THE DATA ALREADY AVAILABLE, IS TO INVESTIGATE CERTAIN METEOROLOGICAL TRANSPORT CHARACTERISTICS, OF SCALE LARGER THAN HAS BEEN CUSTOMARY IN MICROMETEOROLOGICAL (LOCALIZED) APPROACHES, IN ORDER TO UNDERSTAND THE BROADER METEOROLOGICAL SCOPE OF AIR QUALITY REQUIRED FOR REFINING TRANSPORT - DISPERSION - DEPOSITION MODELS FOR AIR POLLUTANTS. A SECONDARY OBJECTIVE, WHICH IS CONSISTENT WITH THE UNIVERSITY PURPOSE AND THE PROXIMITY TO EPA LABORATORIES, IS TO ENCOURAGE AND GUIDE MORE AVAILABLE YOUNG SCIENTISTS INTO PURSUING THE PRINCIPAL OBJECTIVE UNDER THE TERM OF THE PROJECT AS WELL AS THEREAFTER. THE APPROACH AND THE WORK ARE STRUCTURED IN WHAT IS BELIEVED A LOGICAL HEIRARCHY OF TASKS WITH INSIGHT OR SOLUTION OF ONE PROBLEM AREA SERVING APPROACH TO THE NEXT. THESE ARE: (1) METEOROLOGICAL ANALYSIS OF REGIONAL AIR POLLUTION STUDY DATA, INVESTIGATING CONTROLS BY THE BROADER SYNOPTIC CONDITIONS, ESPECIALLY BY AIR TRAJECTORIES OVER A DAY AND MORE AND BY VERTICAL GRADIENTS IN THE HORIZONTAL FLUXES. (2) OXIDANT TRANSPORT IN THE LOWER TROPOSPHERE, AS AFFECTED BY DIURNAL VARIATIONS IN THE DEPTH OF THE MIXED LAYER. (3) MESOSCALE TRAJECTORIES, PARTICULARLY IN THE MIXING LAYER, EXAMINED AS DEPARTURES FROM SYNOPTIC-SCALE FLOW DUE TO MESOCALE TEMPERATURE FIELDS PRODUCED BY URBAN AREAS, BY NATURAL SURFACE DIFFERENCES, AND BY PATCHES OF CLOUD COVER OR CLEAR. (4) ATMOSPHERIC DEPOSITION CHEMISTRY (PARTICULATES AND RAINFALL) AS ASSOCIATED WITH THE ABOVE METEOROLOGICAL CHARACTERISTICS AND PROCESSES.

805556

Homeowner attitudes and behavior towards insects and pesticides will be explored by means of a questionnaire in three U.S. metropolitan areas: the San Francisco Bay region (Calif.), Dallas/Ft. Worth area (Texas), and the New Brunswick/Plainfield area (N.J.). Two socioeconomic neighborhoods, lower middle class and upper middle class, will be selected from each metropolitan area. Approximately 100 persons will be interviewed door-to-door, using standard interview technique, from each socioeconomic group of each state (total sample size = 600). The questionnaire survey will be based, in part, on a questionnaire form used in a recent study on upper middle class homeowners in two Texas cities.

The proposed CA-TX-NJ survey will provide a beginning impression of U.S. homeowner attitudes and practices towards insects and and pesticides. In particular, it will produce a great quantity of specific information that earlier studies have failed to provide. It is expected that the study will also shed insight on questions raised by the recent EPA report of von Rumker (1972) regarding the use of pesticides and their impact on U.S. aquatic environments.

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EFFECT OF CHLORINE DIOXIDE AND CHLORINE DIOXIDE PLUS NITRITES ON MICE
WITH LOW G-6-PD ACTIVITY
   START/ COMPL DATE :    10/77 - 10/78 : FUNDING : EST. - FY   77  / $   52479
    TASK/EPA CODE :D6148-058    / R805557-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : P    HEFFERNAN
   INVESTIGATORS :    G S MOORE                    UNIV. OF MASSACHUSETTS
                      E J CALABRESE                UNIV. OF MASSACHUSETTS
   MILE: 00/77 -BEGIN ANIMAL EXPOSURE
         00/78 -PROJECT COMPLETE
     THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO DETERMINE (VIA IN VIVO STU
     DIES) THE EFFECTS OF CHLORINE DIOXIDE AND CHLORINE DIOXIDE PLUS NITRITE ON
     THE BLOOD OF MICE WITH LOW LEVELS OF GLUCOSE-6-PHOSPHATE D
     EHYDROGENASE ACTIVITY AS COMPARED TO MICE WITH NORMAL G-6-PD ACTIVITY. THE
      PARAMETERS TO BE MEASURED INCLUDE HEMATOCRIT, RETICULOCYTE COUNTS,
     G-6-PD ACTIVITY, MECHANICAL AND OSMOTIC FRAGILITY, AND A C.B.C. (COMPLETE
     BLOOD COUNT). RECENT PUBLISHED RESEARCH (J. TOXIC. & ENVIRON. HLTH.
     1977) BY ONE OF THE INVESTIGATORS (EDWARD J. CALABRESE) HAS INDICATED THAT
      INDIVIDUALS WITH G-6-PD DEFICIENCY REPRESENT A POTENTIAL HIGH
     RISK GROUP TO THE TOXIC EFFECTS OF OXIDANT EXPOSURE. THIS STUDY REPRESENTS
      AN ATTEMPT TO DEVELOP AN ANIMAL PREDICTIVE MODEL FOR A HUMAN HIGH
     RISK GROUP REPRESENTING 13% OF THE BLACK MALE POPULATION.
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II-555

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THE USE OF MODELS IN ENVIRONMENTAL DECISION MAKING CONCERNING AIR
QUALITY
   START/ COMPL DATE :    09/77 - 09/79 : FUNDING : EST. - FY   77  / $  107446
    TASK/EPA CODE :G603A-AB-38  / R805558-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : K    DEMERJIAN
   INVESTIGATORS :   L E LYNN                      HARVARD UNIVERSITY
                     V I NELSON                    HARVARD UNIVERSITY
   MILE: 09/78 -FINAL REPORT
     THE STUDY WILL EVALUATE THE ROLE AIR QUALITY MODELS PLAY IN THE REGULATORY
      DECISION MAKING PROCESS. THE AIM WILL BE TO ASSESS THE NEEDS OF THE AC
     TUAL AND POTENTIAL MODEL USERS, THE CURRENT STATE OF AIR QUALITY MODELLING
      AT EPA, AND HOW THE MODELLING PROCESS MIGHT BE CHANGED TO BETTER MEET
     PRESENT AND FUTURE NEEDS. THE CASE STUDY METHOD WILL BE USED TO IDENTIFY
     FACTORS THAT MAY HAVE POSED OBSTACLES TO THE INTERACTION BETWEEN MOD
     ELLERS AND REGULATORS AND TO HIGHLIGHT CERTAIN PROFITABLE CHANGES THAT MIG
     HT MAKE IT MORE LIKELY THAT AIR QUALITY MODELLING WOULD MAKE A SIGNIFICANT
      CONTRIBUTION TO THE ACHIEVEMENT OF NATIONAL AIR QUALITY OBJECTIVE
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BEST MANAGEMENT PRACTICES FOR UNCONFINED ANIMAL PRODUCTION

START/ COMPL DATE : 10/77 - 03/79 : FUNDING : EST. - FY 77 / $ 55930
TASK/EPA CODE :L617D-23 / R805559-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : S C YIN
INVESTIGATORS : J W ROBBINS LOUISIANA TECHNOLOGICAL UNIV.
J V ALBRITTON LOUISIANA TECHNOLOGICAL UNIV.
MILE: 09/77 -PROJECT INITIATED
12/77 -SELECTION OF CONSULTANTS
11/78 -CONSULTANT WORKSHOPS TO DETAIL MANUAL CONTENTS
12/78 -FIRST DRAFT OF MANUAL
03/79 -FINAL MANUAL PUBLISHED

THE OBJECTIVE OF THIS PROJECT IS TO PREPARE A MANUAL THAT IDENTIFIES, DEFINES AND STRUCTURES THE FORM AND SEQUENCE OF THE WATER QUALITY MANAGEMENT PROCESS FOR UNCONFINED ANIMAL PRODUCTION SYSTEMS. THE MANUAL WILL PROVIDE INFORMATION TO ASSIST IN CARRYING OUT WATER QUALITY PLANNING AND IMPLEMENTATION RESPONSIBILITIES. IT WILL PRESENT METHODOLOGIES FOR THE DEVELOPMENT OF BEST MANAGEMENT PRACTICES FOR THE VARIOUS TYPES OF SYSTEMS ENCOUNTERED WITH LIVESTOCK ON PASTURE AND RANGE. THE METHODOLOGIES WILL CENTER AROUND INQUIRES INTO THE TECHNICAL ASPECTS OF IDENTIFYING AND ASSESSING UNCONFINED ANIMAL NONPOINT SOURCE PROBLEMS, ANALYZING THE PROBLEMS AND DEVELOPING PROCEDURES NEEDED FOR DESIGNING LOCALIZED BEST MANAGEMENT PRACTICES. ALSO, DESCRIPTIONS AND EXAMPLES OF BEST MANAGEMENT PRACTICES WILL BE PRESENTED FOR DEFINED CONDITIONS/SYSTEMS. THE MANUAL WILL BE DEVELOPED FROM EXISTING LITERATURE, COLLABORATION WITH RANGE MANAGEMENT SPECIALISTS, ANALYSIS OF EXISTING SITES, AND CONTACT WITH ONGOING RESEARCH PROJECTS RELATING TO THE SUBJECT. IT WILL NOT INVOLVE ANY NEW FIELD STUDIES.

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NUTRIENTS AND ACIDITY IN WET AND DRY PRECIPITATION

   START/ COMPL DATE :    09/77 - 08/79 : FUNDING : EST, - FY   77  / $   45000
    TASK/EPA CODE :M602A-035    / R805560-01  (GRANT)  PRIOR  FY   /           1
   PROJECT OFFICER : T     MALONEY
   INVESTIGATORS :    P L BREZONIK                     STATE UNIVERSITY OF FLA. SYS.
                      D A LUNDGREN                     STATE UNIVERSITY OF FLA. SYS.
                      W L CHAMEIDES                    STATE UNIVERSITY OF FLA. SYS.
   MILE: 08/79 -FINAL REPORT
    THIS PROJECT ADDRESSES FOUR ASPECTS OF THE ROLE OF THE ATMOSPHERE AS A SO
    URCE OF NUTRIENTS, ACIDITY, OTHER SUBSTANCES TO WATER AND LAND ECOSYSTEMS:
    1) QUANTIFICATION OF LOADINGS OF N, P, ACIDITY AND OTHER SUBSTANCES IN
    WET AND DRY FALLOUT IN PENINSULAR NORTH FLORIDA; 2) EVALUATION OF THE
     MECHANISMS OF INPUT-COMPARISON OF DRY AND WET FALLOUT AND MEASUREMENT
     OF GASEOUS (NH3 AND NO2) ABSORPTION; 3) DOCUMENTATION OF THE
    ECOLOGICAL EFFECTS OF ACID RAIN ON THE STRUCTURE AND FUNCTIONING
    AQUATIC ECOSYSTEMS AND OF THE EFFECTS OF ATMOSPHERIC NUTRIENTS ON LAKE P
    RODUCTIVITY; AND 4) EVALUATION, QUANTIFICATION AND MODELING OF THE FACTORS
    AFFECTING ATMOSPHERIC FLUXES OF NUTRIENTS AND ACIDITY, A SMALL NETWORK
    OF SAMPLING STATIONS IS BEING ESTABLISHED FOR OBJECTIVES (1) AND (2),
    DETAILED STUDIES OF RAINFALL COMPOSITION IN COMPARISON WITH AMBIENT AIR
    QUALITY (PARTICULARLY FOR ATMOSPHERIC NITROGEN FORMS) WILL PROVIDE
    THE BASIS FOR MODELS OF NITROGEN TRANSFORMATION AND TRANSPORT THROUG
    H THE ATMOSPHERE AND DEPOSITION VIA RAINOUT, FALLOUT AND GASEOUS ABSORPTIO
    N. LAKES IN NORTH CENTRAL FLORIDA WILL BE SAMPLED AND STUDIED TO DETERMINE
     THE EXTENT OF ACIDIFICATION CAUSED BY ACID RAINFALL (MEAN PH OF RAI
    NFALL IN GAINESVILLE, FLORIDA FROM JUNE, 1976, TO JUNE, 1977, IS 4,45), ST
    UDIES WILL BE DONE TO DETERMINE EFFECTS OF ACIDIFICATION ON THE LAKE BIOTA
     AND ON PRODUCTIVITY, ORGANIC DECOMPOSITION AND MINERAL CYCLING,
WORKSHOP ON WASTE-TO-ENERGY TECHNOLOGY

    START/ COMPL DATE :    08/77 - 03/78 : FUNDING : EST. - FY   77  / $   25000
     TASK/EPA CODE :B6248-625    / R805561-01  (GRANT)  PRIOR  FY76 /           1
    PROJECT OFFICER : H    FREEMAN
    INVESTIGATORS :   G R SMITHSON                     BATTELLE MEMORIAL INSTITUTE
                      S T DINOVO                       BATTELLE MEMORIAL INSTITUTE
    MILE: 08/77 -FUNDING PACKAGE SUBMITTED
          08/77 -AWARD FUNDS FOR PROJECT
          11/77 -CONFERENCE
          03/78 -SUMMARY REPORT
          00/00 -FINAL REPORT RECEIVED
      THE OBJECTIVE OF THE PROPOSED PROJECT IS TO DEVELOP AND CONDUCT A WORKSHOP
       WHICH WILL PROVIDE A FORUM FOR REVIEWING THE STATE OF THE ART OF
      WASTE-TO-ENERGY TECHNOLOGY, FOR ASSESSING PROBLEM AREAS, AND FOR
      SUGGESTING APPROACHES FOR THE CONTINUED DEVELOPMENT OF THIS TECHNOLOGY.
      PARTICIPANTS IN THE WORKSHOP WILL INCLUDE REPRESENTATIVES FROM BOTH THE
      TECHNOLOGICAL AND USER COMMUNITIES. SPECIES DETAILS REGARDING THE FORMAT,
      SCHEDULING, AND LOCATION OF THE WORKSHOP AS WELL AS THE PREPARATION OF A
      LIST OF POTENTIAL PARTICIPANTS WILL BE DEVELOPED BY A WORKSHOP COMMITTEE
      COMPOSED OF REPRESENTATIVES OF U.S. EPA, BATTELLE, AND OTHERS. THIS COMMI
      TTEE WILL BE SELECTED AND BEGIN ITS WORK IMMEDIATELY UPON THE EXECUTION OF
      THIS GRANT. A BRIEF REPORT IN WHICH THE FINDINGS AND RECOMMENDATI
      ONS OF THE WORKSHOP PARTICIPANTS WILL BE PREPARED AT THE CONCLUSION OF THE
      PROJECT.
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A NEW SAMPLING THEORY FOR THE MEASUREMENT OF ECOSYSTEM STRUCTURE AND
FUNCTION
   START/ COMPL DATE :    10/77 - 09/78 : FUNDING : EST. - FY   77  / $   28500
    TASK/EPA CODE :K609A-312    / R805564-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : J    HILL
   INVESTIGATORS :   R J MULHOLLAND                   OKLA. ST. UNIV.
   MILE: 09/78 -REPORT ON MODEL FOR ASSESSMENT OF ECOSYSTEM EFFECTS BY
     THE PROPOSED RESEARCH WILL FORMALIZE A SAMPLING ALGORITHM, WITH DOCUMEN
     TATION, FOR APPLICATIONS TO ENVIRONMENTAL SAMPLING AND DESIGN OF MICROCOSM
     EXPERIMENTS.
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805569

II-560

1. Objectives: The Ohio River Basin Energy Study (ORBES) was initiated to assess changes that may occur in the various sectors of society, industry, and environment as a result of future increases in number of energy conversion facilities. During the second year of this study each participating research group will address itself to one of the areas thought to be affected. The group from the University of Louisville will address aspects of water quality, water quantity, and special aquatic habitats.

2. Approach: The assessments will be made by compilation and analysis of existing data possibly supported by Special Studies of specific areas where existing data is weak or lacking.

3. Current Plans and/or Progress: Participants from seven midwestern universities divided into three assessment teams have submitted independent preliminary first cut assessments of the changes which may occur as a result of these developments. These assessments will be condensed into one major document which is to be submitted to Congress in July 1977.

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SAMPLING, CHARACTERIZATION PLUS ANALYSIS MANUAL FOR DREDGED AND FILL
MATERIALS
   START/ COMPL DATE :    08/77 - 07/79 : FUNDING : EST, - FY   77  / $  100000
    TASK/EPA CODE :N608A-031    / R805572-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : M D  MULLIN
   INVESTIGATORS :   R A SWEENEY                    STATE UNIVERSITY OF NEW YORK
   MILE: 10/79 -MANUAL READY FOR RELEASE
      OBJECTIVES: PROVIDE REGULATORY AGENCIES WITH A STATE-OF-THE-ART MANUAL FOR
       SAMPLING, CHARACTERIZATION, AND METHODS OF ANALYSIS TO
      INCLUDE QUALITY ASSURANCE PROGRAMS AND REPRESENT AREAS RELATING TO CONTAMI
      NANTS FOUND IN DREDGED AND FILL MATERIAL AND WATER QUALITY ASSESSMENTS FOR
       AQUATIC DISPOSAL AND CONTAMINANT AREA EFFLUENT OR RUNOFF, FURTHER G
      OALS ARE TO PROVIDE INTERPRETIVE GUIDANCE CONCERNING IMPLEMENTATION OF RES
      ULTS OF SAMPLING, CHARACTERIZATION, AND ANALYTICAL METHODS AND TO IDENTIFY
      AREAS WHERE PRESENT INFORMATION OR PROCEDURES ARE INCOMPLETE OR INADEQUATE
      AND RECOMMEND NECESSARY RESEARCH TO ELIMINATE THESE LIMITATIONS.
      APPROACH: MATERIAL WILL BE COMPILED VIA LITERATURE SEARCHES AND
      CONSULTATION WITH THOSE INVOLVED WITH THE ABOVE ACTIVITIES.
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II-562

805577

The objective of this project is to develop a technique for the in-situ calibration of particulate mass monitors for stationary sources. A portable generator is to be developed which is capable of producing suspended particulate matter with controlled concentration and particle size distribution. Several particle generation techniques will be critically evaluated and one selected for further study. The operating characteristics of a prototype particle generator will be measured. The feasibility and limitations of this approach to monitor calibration will be assessed.

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HEALTH IMPACTS OF ACID MINE DRAINAGE ON DRINKING WATER SUPPLIES IN
WESTERN COALS
   START/ COMPL DATE :    06/77 - 00/00 : FUNDING : EST. - FY   77  / $  157800
    TASK/EPA CODE :D625F-114    / R805579-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : D G  GREATHOUSE
   INVESTIGATORS :   B G WIXSON                          UNIV. OF MISSOURI
                     B T KAGEY                           UNIV. OF MISSOURI
                     N L GALE                            UNIV. OF MISSOURI
   MILE: 09/78 -EVALUATION OF LITERATURE AND SAMPLING PLAN FORMULATED
         10/79 -PROJECT COMPLETED
     THE OBJECTIVES OF THIS PROJECT ARE: 1. IDENTIFY COAL MINING AREAS IN WES
     TERN STATES WHERE ACID MINE DRAINAGE MAY GET INTO DRINKING WATER SUPPLIES.
     2. CARRY OUT A LITERATURE REVIEW TO IDENTIFY POSSIBLE COMPOUNDS
     AND LEVELS OF ORGANICS OR INORGANICS THAT MIGHT CAUSE DISEASE. 3. IDENTIFY
      HEALTH EFFECTS ASSOCIATED WITH THESE COMPOUNDS AND THEIR POSSIBLE
     INGESTION . 4. DETERMINE, WHERE POSSIBLE, THOSE COMPOUNDS THAT ARE REMOVED
     BY DRINKING WATER TREATMENT. 5. EVALUATE THE MORTALITY DATA IN RESPECT
     TO SPECIFIC DISEASE RELATIONSHIP IN THE WESTERN COAL STATES. 6. PROPOSE A
      REPRESENTATIVE AREA AND SPECIFY THE ANALYTICAL PROCEDURES, WATER
     CHARACTERISTICS AND TYPE OF EPIDEMIOLOGICAL STUDIES THAT WILL BE
     NECESSARY TO ESTABLISH VALID BASELINES, DEFINE PROBLEMS AND SEEK POSSIBLE
      CONTROL MEASURES. THE INFORMATION COLLECTED AND EVALUATED BY THIS PROJECT
      SHOULD PLAY A MAJOR ROLE IN DETERMINING THE APPROPRIATE AREA FOR CON
     CENTRATED STUDIES ON THE PROBLEMS OF ACID MINE DRAINAGE-WATER SUPPLIES AND
     HEALTH. THIS INFORMATION WILL BE CRITICAL TO THE FUTURE DEVELOPM
     ENT OF WESTERN COALS AND ALLOW FOR THE MAXIMUM UTILIZATION OF FUNDS AND RE
     SEARCH TO ANSWER POSSIBLE QUESTIONS OF HEALTH EFFECTS ASSOCIATED WITH ACID
      MINE DRAINAGE AND DRINKING WATER SUPPLIES.
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II-564

SEASONAL CYCLES IN BODY COMPOSITION, ORGAN SYSTEM FUNCTION, AND
ENERGETICS OF GRASSLAND BIRDS NEAR COLSTRIP, MONTANA
START/ COMPL DATE : 10/77 - 09/78 : FUNDING : EST. - FY 77 / $ 47217
TASK/EPA CODE :M625A-036 / R805581-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : E M PRESTON
INVESTIGATORS : M L MORTON OCCIDENTAL COLLEGE
MILE: 09/78 -FINAL REPORT

IN 1974 THE ENVIRONMENTAL PROTECTION AGENCY (EPA) BEGAN A LONG-TERM STUDY OF AIR POLLUTION EFFECTS ON THE GRASSLAND ECOSYSTEM NEAR COAL-FIRED POWER PLANTS AT COLSTRIP, ARIZONA. THIS STUDY IS BROAD IN SCOPE BUT ONE PARTICULAR ASPECT, OF CONCERN HERE, HAS BEEN ON THE POTENTIAL OF BIRDS AS BIOINDICATORS OF POLLUTION. IN THE THREE YEAR PERIOD, 1974-76, MANY AVIAN SPECIMENS WERE COLLECTED IN THE COLSTRIP AREA BY EPA PERSONNEL AND GREAT QUANTITIES OF DATA WERE GATHERED ON SEASONAL CYCLES IN BODY COMPOSITION, ORGAN SYSTEM FUNCTION, AND BIOENERGETICS. SINCE THE POWER PLANTS DID NOT BECOME FUNCTIONAL UNTIL 1975 AND 1976, THESE DATA HAVE THE POTENTIAL OF PROVIDING A SOLID BASE OF INFORMATION THAT CAN BE USED TO QUANTIFY POLLUTION EFFECTS WHICH MAY ACCRUE IN THE FUTURE. AT THIS TIME, HOWEVER, MANY OF THE COLLECTED BIRD SPECIMENS HAVE NOT UNDERGONE LABORATORY PROCESSING NOR HAS EXISTING DATA BEEN PULLED TOGETHER IN USEFUL FORM. IT IS THE PURPOSE OF THE STUDY PROPOSED HEREIN TO COMPLETE THE NECESSARY LABORATORY PROCEDURES ON STORED SPECIMENS, MAKE ADDITIONAL COLLECTIONS, IF NECESSARY, TO FILL INFORMATIONAL GAPS, COMPILE AND EVALUATE ALL PERTINENT DATA, AND CONSTRUCT A FINAL REPORT OF SUFFICIENT SCOPE AND DETAIL THAT WILL CONSTITUTE AN EFFECTIVE DOCUMENTATION OF BIOLOGICAL RELATION IN GRASSLAND BIRDS OF THE COLSTRIP AREA.

FERTILIZER EVALUATION OF DEWATERED, SOLVENT-DRIED SLUDGE

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   START/ COMPL DATE :    10/77 - 01/79 : FUNDING : EST. - FY   77  / $   92930
    TASK/EPA CODE :C611B-7218   / R805584-01  (GRANT)  PRIOR  FY    /          1
   PROJECT OFFICER : H    WALL
   INVESTIGATORS :   R S DOMENOWSKE
                     R L OLSON                        MUNICIPALITY OF METRO, SEATTL
                     D F BEZDICEK                     RESOURCES CONSERVATION COMPAN
  MILE: 08/77 -FUNDING PACKAGE COMPLETED              WASHINGTON STATE UNIVERSITY
        10/77 -GRANT AWARDED
        12/77 -PROJECT STARTED
        04/79 -PROJECT COMPLETED
        10/79 -FINAL REPORT PUBLISHED
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THE OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE SUITABILITY OF SOLVENT-DRIED MUNICIPAL SLUDGE FOR FERTILIZER. A BATCH OF MUNICIPAL SLUDGE WILL BE PARTLY DRIED BY SOLVENT DRYING AND PARTLY BY HEAT DRYING AND THE TWO PARTS COMPARED AS FERTILIZER USING LABORATORY TESTS AND GREENHOUSE GROWTH TESTS ON VEGETABLE AND FIELD CROPS. THE WORK WILL BE DONE AT SEATTLE, WASHINGTON WHERE THE SLUDGE WILL BE OBTAINED AND DRIED AND THE LABORATORY AND GREENHOUSE TESTS WILL BE CONDUCTED AT WASHINGTON STATE UNIVERSITY, PULLMAN, WASHINGTON.

805585

II-566

(1) To collect basic information about the institutional, socio-economic physical, biological, industrial, mining and agricultural make-up of West Virginia and the Ohio River Basin to enable an interdisciplinary technology assessment team to predict the impact of future (1985 and 2000 A.D.) energy demands and production on the economy, social patterns and the environment of the Ohio River Basin, including West Virginia.

(2) Interdisciplinary assessment by 9 public universities in the six state area of Pennsylvania, West Virginia, Ohio, Kentucky, Indiana, and Illinois.

(3) The first of three years, involving data collection, and growth prediction has been completed for all but West Virginia and Pennsylvania, both of which are joining the project in the second year.

The project is called ORBES, Ohio River Basin Energy Study.

1. The Ohio River Basin Energy Study (ORBES), Phase II: An Impact Assessment of Energy Conversion Facilities in the Ohio River Basin, is a continuation of a comprehensive, policy-oriented technology assessment addressing the broad-scale environmental, public health, economic, institutional, and social effects of locating various combinations of energy conversion and support facilities in the Ohio River Basin.

2. The approach is that of integrated technology assessment, conducted by an interdisciplinary, interinstitutional (eight state universities in the six study region states of Illinois, Indiana, Kentucky, Ohio, Pennsylvania, and West Virginia) team, with support research performed by other personnel on a schedule to best fit the research needs of the technology assessment team.

3. Phase I of the study, conducted in 1976-77, was a preliminary, "first-cut" impact assessment. Most impacts identified were first-order. In Phase II, data and assessments made in the first year will be drawn upon, and inadequacies identified will be corrected.

805588

1. Objectives. The Experimental Management Plan for the Ohio River Basin Energy Study (ORBES), Phase II: An Impact Assessment of the Effect of Energy Conversion Facilities in the Ohio River Basin is a continuation of the management of a comprehensive, poli oriented technology assessment addressing the broad-scale environmental, public health, economic, institutional, and social effects of locating various combinations of energy conversion and support facilities in the Ohio River Basin.

2. Approach. The integrated technology assessment is being conducted by an interdisciplinary, interinstitutional (eight state universities in the six study-region states of Illinois, Indiana, Kentucky, Ohio, Pennsylvania, and West Virginia) team, with support research performed by other personnel on a schedule to best fit the research needs of the technology assessment team. The management of this research will involve a complex arrangement to best coordinate efforts and further the achievement of research goals A four-person Project Office will perform day-to-day coordination, while a seven-person Management Team consisting of the Experimental Management Plan co-principal investigators and five U.S. Environmental Protection Agency representatives will provide long-term and policy guidance.

3. Current Plans and/or Progress. In Phase I of the study, the Project Office and Management Team coordinated a similar study, although that phase involved three preliminary assessment teams drawn from seven university campuses (whose reports were then integrated by the Project Office). The experience gained during Phase I will be utilized in Phase II. In Phase II, data and assessments made in the first year will be drawn upon and inadequacies identified will be corrected.

805589

II-569

This project is the second phase of a technology assessment of energy development in the Ohio River Basin. A core team composed of members from nine different university campuses in six states will direct and delineate research activities in this phase of the program. First, reports from Phase I of the project will be reviewed and key issues for further research identified. The baseline data for the study will be refined and a new set of energy facility siting criteria developed. The core team will then review basic technological, sociological, and demographic assumptions and create a set of energy development scenarios relative to coal mining, transportation, and conversion facilities, and to other types of energy facilities in the study region.

Given these scenarios the impacts of the energy facilities on the physical environment, socio-economic conditions, ecological factors, public health, institutions, land use, and the quality of life will be assessed. The Phase II impact analysis will emphasize the tracing of second and higher-order impacts and the interrelationships among them. Based upon the impact assessment, a range of possible options under each scenario will be determined.

805590

II - 570

The objective of the ORBES project is to conduct an Integrated Technology Assessment of energy conversion facilities in the Ohio River Basin Region. The past year has seen over one hundred researchers at eight campuses in the Region collecting and analyzing baseline data in relevant areas in order to conduct a first-cut or "mini"-assessment. The second year of the project (Phase II) is to be devoted to identifying, requesting, and supervising research in areas deemed inadequately covered in the first year. The project has been reconstructed so that there is a Core Team of thirteen researchers from ten institutions (the ORBES region has been expanded to include West Virginia and Western Pennsylvania in addition to last year's Ohio, Indiana, Illinois and Kentucky areas) who will perform the Integrated Technology Assessment. The Core Team represents a variety of relevant disciplines capable of taking on the assessment task.

The University of Kentucky's two Core Team members represent the disciplines of sociology and economic geography. In addition, the anthropologist is helping conduct the social impact assessment of increased power production in the ORBES area. Contributions to be expected include a study of the impact of service areas on electric power generation and transmission and further refinement of the social impact assessment analysis. The latter study includes an operationalization of an environmental orientation paradigm, preparation of demographic profiles of counties likely to be impacted by energy conversion facilities, classification of counties by environmental orientation and an impact assessment. This work will be used cooperatively and integratively by the Core Team to perform the Technology Assessment.

PILOT STUDY OF ACUTE BRONCHITIS AND ITS RELATION TO AIR POLLUTION

START/ COMPL DATE : 11/77 - 06/78 : FUNDING : EST. - FY 77 / $ 50000
TASK/EPA CODE :H601C-7252 / R805593 (GRANT) PRIOR FY / 1
PROJECT OFFICER : D C CALAFIORE
INVESTIGATORS : M DEANE STATE EPIDEMIOL. STUDIES LAB.
J R GOLDSMITH STATE EPIDEMIOL. STUDIES LAB.
MILE: 11/77 -AWARD GRANT
06/78 -FINAL REPORT

OBJECTIVES: THE OBJECTIVES OF THIS PROJECT ARE TO DEVELOP AND COMPARE TWO OR MORE STRATEGIES TO EXAMINE THE POSSIBLE RELATIONSHIP BETWEEN COMMUNITY AIR POLLUTION AND ACUTE BRONCHITIS. THE PROJECT INCLUDES A PILOT FIELD STUDY IN WHICH THE STRATEGIES WOULD BE COMPARED WITH RESPECT TO WILLINGNESS OF SUBJECTS TO PARTICIPATE AND EFFECTIVENESS IN MEASURING INCIDENCE OR PREVALENCE OF ACUTE BRONCHITIS. ANALYSIS OF DATA WOULD INCLUDE TESTING, ON A DEMONSTRATION BASIS, THE NULL HYPOTHESIS BASED UPON WHETHER EXPOSURE TO AIR POLLUTION IN THE SOUTH COAST AIR BASIN AFFECTS THE INCIDENCE OR PREVALENCE OF CHRONIC BRONCHITIS. APPROACH: A) AN INTERVIEW SURVEY ASKING ABOUT EPISODES DURING A DEFINED PERIOD, SUCH AS THE PRECEDING SIX OR TWELVE MONTHS. THIS WOULD BE TIMED SO AS TO FOLLOW CLOSELY THE SEASON OF HEAVIEST POLLUTION AND MIGHT BE REPEATED ONE OR MORE TIMES; AND B) ENROLLMENT OF A PANEL OF SUBJECTS WHO WOULD BE ASKED TO RECORD SYMPTOMS ON A DAILY BASIS OR WHO MIGHT BE CONTACTED PERIODICALLY BY TELEPHONE, MAIL, OR IN PERSON TO ELICIT SYMPTOMS. CURRENT PLANS AND/OR PROGRESS: GEOGRAPHIC AREAS AND POPULATION SAMPLES WILL BE SELECTED. A QUESTIONNAIRE AND DIARY WILL BE DESIGNED AND PRE-TESTED. A PILOT STUDY WILL BE CONDUCTED.

MODELING OF ATMOSPHERIC FLOWS AND POLLUTANT DISPERSAL OVER AND AROUND HILLS AND BUILDINGS

START/ COMPL DATE : 09/77 - 09/78 : FUNDING : EST. - FY 77 / $ 63000
TASK/EPA CODE :G603A-AB-34 / R805595-01 (GRANT) PRIOR FY76 / $ 500001
PROJECT OFFICER : W SNYDER
INVESTIGATORS : S P ARYA UNIV. OF NORTH CAROLINA
J C HUNT UNIV. OF NORTH CAROLINA
V R LAMB UNIV. OF NORTH CAROLINA
MILE: 09/81 -FINAL REPORT

IT IS PROPOSED TO INVESTIGATE THE ATMOSPHERIC FLOWS OVER AND AROUND HILLS AND BUILDINGS AND THE DISPERSION AND DIFFUSION OF POLLUTANTS IN SUCH FLOWS USING BOTH THE PHYSICAL AND NUMERICAL MODELING APPROACHES. FOR PHYSICAL MODELING, WE SHALL USE THE METEOROLOGICAL WIND TUNNEL, SALT WATER STRATIFIED TOWING TANK OR FLUME AND OTHER SUPPORT FACILITIES OF THE EPA FLUID MODELING FACILITY IN RESEARCH TRIANGLE PARK. THE MODEL HILLS OR BUILDINGS WILL BE PLACED IN THE SIMULATED ATMOSPHERIC BOUNDARY LAYER (IN THE WIND TUNNEL) AND OBSERVATIONS OF MEAN FLOW, TURBULENCE AND DIFFUSION WILL BE MADE WITH THE SPECIFIC OBJECTIVE OF DETERMINING THE TOPOGRAPHICAL EFFECTS ON FLOW AND DIFFUSION. SIMILAR TOPOGRAPHICAL MODELS WILL ALSO BE TOWED IN THE SALT-WATER STRATIFIED TANK AND MEASUREMENTS OF VELOCITY, DENSITY AND CONCENTRATION AS WELL AS FLOW VISUALIZATIONS WILL BE MADE OVER A WIDE RANGE OF FROUDE NUMBERS. THE PROPOSED EXPERIMENTS ARE IN THE NATURE OF CONTINUING OUR BASIC STUDIES OF FLOW AND DIFFUSION OVER SMALL-SCALE TOPOGRAPHY, WHICH ARE BEING CONDUCTED UNDER A GRANT FROM THE ENVIRONMENTAL PROTECTION AGENCY. THE LABORATORY DATA WILL BE USED TO TEST THE EXISTING THEORIES OF FLOW AND DIFFUSION OVER AND AROUND HILLS AND ALSO TO FORMULATE BETTER THEORIES. SINCE ROTATIONAL EFFECTS CANNOT BE SIMULATED IN THESE EXPERIMENTS, WE PROPOSE TO STUDY THEM WITH THE HELP OF NUMERICAL MODELING EXPERIMENTS. IN PARTICULAR, THE STEADY FLOW OF A ROTATING STRATIFIED FLUID OVER AND AROUND A THREE-DIMENSIONAL HILL WILL BE STUDIED FOR THE VARIOUS COMBINATIONS OF THE RELEVANT PARAMETERS (FROUDE NUMBER, ROSSBY NUMBER, ETC.).

II-573

DETERMINE THE EFFECTIVENESS OF REGULATIONS AND PRACTICES FOR HANDLING TOXIC STRIP MINE SPOILS TO PREVENT ACID MINE DRAINAGE

START/ COMPL DATE : 09/77 - 03/79 : FUNDING : EST. - FY 77 / $ 112500
TASK/EPA CODE :B6238-508 / R805598-01 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : J L KENNEDY
INVESTIGATORS : D R THOMPSON — STATE BUR. OF SURFACE MINE
M T DOUGHERTY — ACKENHEIL & ASSOC. GEO. SYS.
MILE: 08/77 -FUNDING PACKAGE SUBMITTED
09/77 -AWARD FUNDS FOR PROJECT
09/78 -AWARD CONTINUATION
03/79 -FINAL REPORT RECEIVED

THE OBJECTIVE OF THE PROPOSED RESEARCH PROJECT IS TO DETERMINE IF MODERN REGULATIONS AND PRACTICES GOVERNING HANDLING OF TOXIC STRIP MINE SPOIL MATERIALS HAVE BEEN EFFECTIVE IN CONTROLLING ACID MINE DRAINAGE AFTER MINING AND RECLAMATION HAVE BEEN COMPLETED. THE PROJECT WILL INCLUDE THE EVALUATION OF SIXTEEN STRIP MINES IN THE COMMONWEALTH OF PENNSYLVANIA. THESE MINES WILL HAVE BEEN RECLAIMED FOLLOWING LAWS AND REGULATIONS WHICH REQUIRED THAT TOXIC SPOIL MATERIALS BE SEGREGATED DURING MINING AND THAT THE TOXIC MATERIAL BE BACKFILLED IN ACCORDANCE WITH SPECIFICATIONS DESIGNED TO PREVENT RESIDUAL ACID MINE DRAINAGE. SPOIL SAMPLES WILL BE OBTAINED FROM A TEST BORING PROGRAM. THE POTENTIAL TOXICITY OF THE SPOIL SAMPLES WILL BE DETERMINED BY LABORATORY ANALYSIS. STATISTICAL METHODS WILL BE USED TO DETERMINE THE RELATION BETWEEN ACID MINE DRAINAGE PRODUCTION AND THE PRESENCE OF TOXIC STRIP MINE SPOILS, THEIR CONFIGURATION WITHIN THE RECLAIMED STRIP MINE, AND THE LOCATION OF GROUND WATER WITH RESPECT TO THE TOXIC MATERIALS.

II-574

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HEALTH EFFECTS OF ENERGY BY-PRODUCTS ON DRINKING WATER

   START/ COMPL DATE :    00/00 - 00/00 : FUNDING : EST. - FY   77  / $  101976
    TASK/EPA CODE :D625F-113    / R805599-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : D G  GREATHOUSE
   INVESTIGATORS :    M A SHAPIRO                     UNIV. OF PITTSBURGH
                      A A SOOKY                       UNIV. OF PITTSBURGH
                      J L SYKORA                      UNIV. OF PITTSBURGH
                      J B ANDELMAN                    UNIV. OF PITTSBURGH
   MILE: 10/78 -PROJECT COMPLETION
     THE OBJECTIVES OF THIS STUDY ARE (A) EVALUATION OF SOURCES, PRODUCTION AND
      UTILIZATION OF COAL ENERGY RELATED BY-PRODUCTS, (2) EVALUATION OF
     HEALTH EFFECTS OF COAL ENERGY BY-PRODUCTS, (3) EVALUATION OF COAL
     ENERGY BY-PRODUCTS INTRODUCED INTO DRINKING WATER SUPPLIES, (4) EVALUATION
     OF INFORMATION OBTAINED FROM 1, 2 AND 3 ABOVE TO DEFINE FUTURE RESEARCH
     NEEDS.THIS STUDY WILL BE BASED ON INFORMATION PUBLISHED IN PERIODICALS,
     BOOKS, REPORTS OR AVAILABLE RAW DATA. FIVE SEPARATE TASKS WILL COVER ALL T
     HE ESSENTIAL ASPECTS OF SOURCES AND HEALTH EFFECTS OF CONTAMINANTS DERIVED
     FROM COAL ENERGY PRODUCTION AS WELL AS THE PATHWAYS THROUGH WHICH THEY
      ENTER DRINKING WATER SUPPLIES. THE CONCLUSIONS OF THE STUDY WILL ALLOW
      FORMULATION OF FUTURE RESEARCH AND DEVELOPMENT NEEDS IN THE AREA OF COAL
     ENERGY UTILIZATION AND PRODUCTION AS RELATED TO DRINKING WATER QUALITY.
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FATE AND EFFECTS OF SEDIMENTS FROM COMBINED SEWER AND STORM DRAIN
OVERFLOW IN SEATTLE NEARSHORE WATERS
   START/ COMPL DATE :    10/77 - 03/79 : FUNDING : EST, - FY   77  / $  130000
    TASK/EPA CODE :C611A-7107   / R805602     (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : J N  ENGLISH
   INVESTIGATORS :   G D FARRIS                      SEATTLE WATER QUALITY DIVISIO
                     R   DOMENOWSKE                  SEATTLE WATER QUALITY DIVISIO
   MILE: 10/77 -PROJECT START
         03/79 -PROJECT COMPLETION
         09/79 -FINAL REPORT
     OBJECTIVES: DETERMINE THE DISTRIBUTION PATTERNS AND FATE OF SUSPENDED
     PARTICULATES EMANATING FROM REPRESENTATIVE COMBINED SEWER OVERFLOWS AND
     STORM DRAINS IN THE SEATTLE AREA, DETERMINE SEASONAL DIFFERENCES AND CO
     RRELATE QUANTITATIVE IN-SITU OBSERVATIONS WITH SUSPENDED SOLIDS LOADING FA
     CTORS AND CURRENT PATTERNS, DETERMINE THE EFFECTS OF THE SETTLED PARTICULA
     TES AND ASSOCIATED CONTAMINANTS ON THE POPULATION DISTRIBUTIONS OF BENTHIC
     ORGANISMS. ASSESS THE AREAWIDE DISTRIBUTION OF THE PARTICULATE
     CONTAMINANTS,
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80560B

II-576

This study is part of a technology assessment of the social, economic and environmental consequences to be expected from an increased concentration of energy facilities within the Ohio River Basin.

II-577

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DATA BASE LOCATION & EVALUATION FOR HEAVY METALS DISCHARGE INTO
MUNICIPAL WASTEWATER COLLECTION AND TREATMENT SYSTEMS
   START/ COMPL DATE :    10/77 - 07/79 : FUNDING : EST. - FY   77  / $   48813
    TASK/EPA CODE :C6118-7220   / R805606-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : S A  HANNAH
   INVESTIGATORS :   R A MINEAR                      UNIV. OF TENNESSEE
                     R A BALL                        UNIV. OF TENNESSEE
   MILE: 10/77 -PROJECT START
         07/78 -INTERIM REPORT
         07/79 -FINAL REPORT
     OBJECTIVES: TO LOCATE, SURVEY, TABULATE AND GENERALLY EVALUATE THE DATA
     BASES AVAILABLE THAT RELATE TO ASSESSMENT OF RELATIVE SOURCE CONTRIBUTION
     OF HEAVY METALS TO PUBLICLY OWNED WASTEWATER TREATMENT SYSTEMS.
     APPROACH: THE PROJECT WILL BE CONDUCTED IN TWO PHASES. PHASE I WILL BE DIR
     ECTED AT AN INTENSIVE AND COMPREHENSIVE SEARCH FOR DATA BASES RESULTING IN
     TABULATION ACCORDING TO GEOGRAPHICAL LOCATION, POPULATION AND
     INDUSTRIALIZATION CLASSIFICATIONS AND EXPRESSED IN TERMS OF EXTENT OF DATA
     BASE EXISTENCE. PHASE II WILL BE DIRECTED AT QUALIFICATION OF DATA BASE U
     SEFULNESS IN TERMS OF INCLUSIVENESS, QUANTITY OF DATA, QUALITY OF DATA AND
     ABILITY TO ASSESS TOTAL METAL DYNAMICS IN A GIVEN SYSTEM. OUTPUTS:
     PHASE I - INTERIM REPORT ON AVAILABILITY OF DATA SOURCES AND A QUALITATIVE
     EVALUATION OF USEFULNESS. PHASE II - FINAL REPORT WITH A QUANTITATIVE
     EVALUATION OF THE DATA BASES LOCATED IN PHASE I.
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805608

II-578

The objectives of this proposal is to develop an information and data base for the detailed consideration of potential impacts of future energy requirements and conversion activities in the Ohio River Basin. Phase I includes: demography, energy use by source and by sector; electricity exported and imported; energy reserves, electrical generation capability by facility and fuel type; plant ownership; and social and economic data on region residents. In Phase II the baseline data will be completed by additional information on migration, land use projections, induced industry, public health, water and air quality, coal mining, social services, recreational facilities and economics.

The approach will include: 1. collection of available baseline data; 2. Extensive literature search; 3. Data and information analysis; 4. Participation in Core Team and public meetings. The results will be compiled into a complete and comprehensive documents.

Current plans include collection and evaluation of baseline data identical to those already obtained for Illinois, Indiana, Kentucky and Ohio and parallel those to be obtained by all states involved. This includes also participation on Development of Phase II Work Plan, Energy Conversion Configurations, Impact assessment and Definition of Policy Options.

805609

II-579

This set of studies represents a portion of a multi-institutional policy-oriented technology assessment of the socioeconomic and environmental impacts which might result from a proposed increased concentration of energy conversion facilities within the Ohio River Basin.

Utilizing the best available data bases, these studies will attempt to address the broad-scale environmental, institutional, economic and social effects of various future combinations of energy conversion facilities (i.e., coal-based plants producing synthetic fuels, as well as nuclear and coal-fired electric power generating plants) and their required support facilities (i.e., coal mining, processing and transportation; ash and sludge disposal facilities; nuclear fuel and reactor waste transportation facilities; and energy transportation systems, including electrical power transmission systems) that might be built and operated in this region in the future.

The principal objectives of this assessment are (1) to assist in outlining the full range of policy options for dealing with selected kinds of development, alternative levels of development and their possible undesirable effects, and alternative technological levels of environmental controls; and (2) to analyze the probable impacts that would result from implementing each option in its total framework, with special emphasis on the natural environment and its interrelationship with public health and welfare. The full range of primary, secondary, and higher order effects will be considered.

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CO-FIRING OF SOLID WASTE WITH COAL IN A CEMENT KILN

     START/ COMPL DATE :    07/77 - 12/78 : FUNDING : EST. - FY   77  / $  200000
      TASK/EPA CODE :B6248-626    / R805613-01  (GRANT)  PRIOR  FY76 /         1
     PROJECT OFFICER : R    OLEXSEY
     INVESTIGATORS :   C R WILLEY                         STATE ENVIRON, SERVICE
     MILE: 08/77 -FUNDING PACKAGE SUBMITTED
           09/77 -AWARD FUNDS FOR PROJECT
           12/78 -FINAL REPORT
      THE OBJECTIVE OF THIS PROJECT IS TO INVESTIGATE THE TECHNICAL AND ECONOMIC
       FEASIBILITY OF CO-FIRING SOLID WASTE WITH COAL IN AN EXISTING FULL-SCALE
       CEMENT KILN, THIS PROJECT WILL ADDRESS BOTH THE RESOURCE RECOVERY
      ASPECTS OF USING WASTE AS A SUPPLEMENTARY FUEL AND THE INDUSTRIAL CONSERV
      ATION ASPECTS OF PRESERVING CONVENTIONAL (HIGH-PRICED, HIGH-SULFUR) FOSSIL
      FUELS. APPROXIMATELY 3000 TONS OF REFUSE-DERIVED FUEL WILL BE CO-FIRED IN
      THE DIRECT-FIRED KILN, DURING THESE CO-COMBUSTION TEST, ENVIRONMENTAL
      ANALYSES OF PROCESS EFFLUENTS WILL BE CARRIED OUT,
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ROLE OF AQUATIC COMMUNITIES IN EVALUATING STRATEGIES, ESTABLISHING
STANDARDS & MONITORING PROGRAMS FOR WATER QUALITY MANAGEMENT
START/ COMPL DATE : 10/77 - 09/79 : FUNDING : EST. - FY 77 / $ 66302
TASK/EPA CODE :C619A-7116 / R805614-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : E T OPPELT
INVESTIGATORS : W U BRIGHAM UNIV. OF ILLINOIS
MILE: 10/77 -PROJECT BEGIN
05/78 -COMPLETE PHASE I CONCEPTS AND PROCEDURES
10/78 -COMPLETE PHASE II STANDARDS
10/79 -COMPLETE PHASE III MONITORING
04/80 -FINAL REPORT

THE PURPOSES OF THIS INVESTIGATION ARE TO INVESTIGATE THE ROLE OF AQUATIC COMMUNITIES IN EVALUATING STRATEGIES FOR WATER QUALITY MANAGEMENT; TO DEFINE THE TERM FISHABLE IN LIGHT OF NON-STEADY-STATE ENVIRONMENTAL EFFECTS; TO EXPLORE & RECOMMEND APPROPRIATE STANDARDS WHICH ACCOUNT FOR THESE EFFECTS, AND; TO DESIGN & TEST A RESPONSIVE MONITORING PROGRAM. IN PURSUING THESE OBJECTIVES, THE RELATIONSHIP BETWEEN AQUATIC BIOLOGICAL COMMUNITIES AND THEIR PHYSICAL AND CHEMICAL ENVIRONMENT WILL BE EXPLORED. THE SURVIVAL OR DEMISE OF COMMUNITIES WILL BE RELATED TO SPATIAL AND TEMPORAL PATTERNS OF PHYSICAL AND CHEMICAL EVENTS. IF POSSIBLE, SURVIVAL WILL BE RELATED TO SUCH STATISTICAL MEASURES AS EXPECTED MAGNITUDE, DURATION, AND RECURRENCE OF CRITICAL CHEMICAL CHARACTERISTICS AND WILL BE RELATED TO NATURAL AND MAN-INDUCED EFFECTS SO THAT, IN THE END, CAUSES AND EFFECTS OF MANAGEMENT CONTROL CAN BE ASSESSED. THE PROJECT WILL BE CONDUCTED IN THREE PHASE: PHASE I WILL ELUCIDATE THE INTERRELATIONSHIP AMONG ABIOTIC AND BIOTIC FACTORS. PHASE II WILL DEMONSTRATE THE USE OF THESE INTERRELATIONSHIPS AS GUIDELINES FOR THE ESTABLISHMENT OF STANDARDS, USING EXISTING CHEMICAL; PHYSICAL AND BIOLOGICAL COMMUNITY DATA FROM THE DUPAGE (ILLINOIS) AND ENOREE (N. CAROLINA) RIVER BASINS IN CONJUNCTION WITH WATER QUALITY MODELLING. PHASE III WILL CONSIDER THE NATURE OF THE MONITORING PROGRAM NECESSARY TO DEVELOP THE PHASE-II STANDARDS (USING THE DUPAGE RIVER AS AN EXAMPLE CASE.)

805615

II -582

A proposal is submitted to hold a conference in Cincinnati, Ohio, on the topic: "Intergovernmental Energy and Environmental Cooperation: The Ohio Valley Challenge." About 75 individuals from all levels of government will be convened to discuss the topic and to recommend approaches to various problems.

II-583

805620

Recently enacted laws to be administered by the Environmental Protection Agency (EPA) call for regulation of toxic or hazardous materials in both products and waste discharges from manufacturing operations. Because of potential conflicts which may arise from attempts to simultaneously regulate air, water, solid discharges and product contaminants, an approach is needed to obviate toxic chemical generation in manufacturing through feedstock or process modification.

The proposed research effort will evaluate typical toxic discharges and product contaminants for the 16 primary unit processes: nitration, amination by ammonolysis, diazotization, halogenation, sulfonation, oxidation, Friedel-Crafts, acylation, hydrogenation, hydroformylation, esterification, saponification, hydrolysis, alkylation, polymerization, cracking. If toxic discharges and contaminants can be so characterized, and if the unit processes used in a given industry segment or plant are identified, then EPA would have a clearer understanding of potential emissions, and, therefore, would be in a better position to formulate regulatory development activities

The objective of this effort is to characterize toxic discharges and product contaminants for representative manufacturing operations which utilize the 16 unit processes and to assess the needs for new control technologies, feedstock and process modifications to eliminate them.

805621

II - 584

The City of Chicago Refuse-Derived Fuel Project is one of the first full-scale, second-generation refuse-derived fuel (RDF) project in the country. The Chicago project is owned and operated by the City. It is designed to process 1,000 tons-per-day of waste in two operating shifts and has a completely redundant process line. The system uses two-stage shredding with a vibrating pan-type air classifier in between. The air classifier is designed to recover about 77 percent of the incoming waste as light fraction. The heavy fraction passes under a magnetic drum to recover ferrous metals. After secondary shredding in a wind-swept vertical shaft mill to reduce the particle size to 1½ inches, the RDF is pneumatically transported to storage bins at the adjacent Commonwealth Edison (CE) Crawford Power Station. The RDF will be cofired with coal in two large suspension fired boilers (225 and 357 mw) at a 10 percent heat input rate.

The scope of this project can be divided into four broad sections: a) Development of the Evaluation Plan, b) Collection of Data, c) Analysis of Data, and d) Preparation of Reports.

The purpose of the project is to assist the EPA contractor in the preparation of a comprehensive analysis of the system by data collection, data analysis, and reporting that can be used by both engineers and decision-makers in comparing this system to alternate resource recovery systems. Toward this end, the output of this project is to be well-written, comprehensive evaluation of this project that is suitable for use by other governmental agencies.

BIOLOGICAL ASSESSMENT OF EXPOSURE TO SULFUR DIOXIDE AND ACID SULFATE

START/ COMPL DATE :   06/77 - 12/80 : FUNDING : EST. - FY   77 / $ 105000
 TASK/EPA CODE :H625F-7187   / R805622-01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER : C G HAYES
INVESTIGATORS :   K V RAJAGOPALAN   DUKE UNIVERSITY
MILE: 11/77 -AWARD GRANT
      11/78 -PROGRESS REPORT
      11/79 -PROGRESS REPORT - GRANT CONTINUATION APPLICATION
      11/80 -FINAL REPORT

THE USE OF HIGH-SULFUR COAL AS A SOURCE OF ENERGY IS EXPECTED TO GENERATE HIGHER ATMOSPHERIC CONCENTRATIONS OF SULFUR DIOXIDE AND ACID SULFATE. IT IS GENERALLY BELIEVED THAT THESE COMPOUNDS COULD AFFECT THE HEALTH OF HUMAN POPULATIONS WHICH MAY BE EXPOSED TO THEM. BECAUSE OF THIS, IT IS OF ADVANTAGE TO HAVE AVAILABLE RELIABLE BIOLOGICAL INDICES FOR DETECTION OF EXPOSURE TO THESE CHEMICALS. THE RELEVANT TESTS SHOULD BE APPLICABLE TO BLOOD SAMPLES OBTAINED FROM SAMPLES OF HUMAN POPULATION. IN THE CASE OF SULFUR DIOXIDE, IT IS CONCEIVABLE THAT METABOLITES SUCH AS SULFITE, THIO-SULFATE AND S-SULFOCYSTEINE MAY BE PRESENT IN THE BLOOD OF EXPOSED INDIVIDUALS IN CONCENTRATIONS HIGHER THAN THOSE IN NORMAL POPULATIONS. USING THE RAT AS THE EXPERIMENTAL ANIMAL, THIS PROJECT WILL EXPLORE THE POSSIBILITY OF DEVELOPING SENSITIVE TESTS FOR THE PRESENCE OF THESE COMPOUNDS IN BLOOD OF ANIMALS EXPOSED TO VARIOUS LEVELS OF SO2. PROCEDURES FOR ASSESSING EXPOSURE TO ACID SULFATE MAY ALSO BE POSSIBLE TO DEVELOP. SINCE SULFITE OXIDASE IS AN ENZYME CAPABLE OF DETOXIFYING SO2, METHODS FOR EPIDEMIOLOGICAL TESTING OF SULFITE OXIDASE IN HUMAN POPULATIONS WILL ALSO BE INVESTIGATED.

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NEUTRALIZATION/PRECIPITATION MANUAL OF PRACTICE

    START/ COMPL DATE :    09/77 - 09/79 : FUNDING : EST. - FY   77  / $   90000
     TASK/EPA CODE :B610C-593    / R805623-01  (GRANT)  PRIOR  FY76 /          1
    PROJECT OFFICER : G F  WEESNER
    INVESTIGATORS :   F   ELLERBUSCH               MITRE CORPORATION
    MILE: 08/77 -FUNDING PACKAGE SUBMITTED
          09/77 -AWARD FUNDS FOR PROJECT
          09/79 -FINAL REPORT RECEIVED
     THE PRIMARY EMPHASIS OF THIS MANUAL WILL BE ONE OF REMOVAL OF HEAVY METALS
      FROM WASTEWATER COMMONLY ASSOCIATED WITH ELECTROPLATING/METAL FINISHING
     INDUSTRIES, SINCE DATA WILL BE COLLECTED FROM ALL CORNERS OF THE INORGA
     NIC AND METALS INDUSTRY, IT IS FELT THAT THE MOP WILL BE WIDELY APPLICABLE
      TO THESE AREAS AS WELL. MITRE'S APPROACH WILL BE ONE OF UNIT OPERATIO
     N/UNIT PROCESS OPTIMIZATION OF DESIGN CRITERIA, SELECTION, AND OPERATIONS-
     MAINTENANCE FOR USE UNDER REAL WORLD CONDITIONS, GENERAL AREAS TO BE COVER
     ED INCLUDE: THEORY, DESIGN AND UPGRADING, OPERATION AND EQUIPMENT, COSTING
      AND ECONOMICS, CASE HISTORIES AND APPLICATIONS, AND BIBLIOGRAPHY.
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ECOSYSTEM RESPONSES TO ALTERNATIVE PESTICIDES IN THE TERRESTRIAL ENVIRONMENT - A SYSTEMS APPROACH

START/ COMPL DATE : 10/77 - 09/80 : FUNDING : EST. - FY 77 / $ 116119
TASK/EPA CODE :M714F-37 / R805624-01 (GRANT) PRIOR FY / 1
PROJECT OFFICER : J W GILLETT

INVESTIGATORS :	
E D GOODMAN	MICHIGAN STATE UNIVERSITY
J W BUTCHER	MICHIGAN STATE UNIVERSITY
M J ZABIK	MICHIGAN STATE UNIVERSITY
R T KON	MICHIGAN STATE UNIVERSITY

MILE: 09/80 -FINAL REPORT

THE IMMEDIATE OBJECTIVE IS TO FORMULATE AND VALIDATE A MODEL FOR THE EFFECTS OF AZINPHOSMETHYL (GUTHION) APPLIED TO APPLE ORCHARDS. GENERALIZATION TO OTHER COMPOUNDS AND TERRESTRIAL ECOSYSTEMS IS THE ULTIMATE OBJECTIVE. WORK PLANNED INCLUDES CONTINUATION OF EXPERIMENTAL FIELD TREATMENT AND SAMPLING, LABORATORY CULTURE AND TOXICOLOGICAL TESTING OF SOIL/LITTER INVERTEBRATES, AND MATHEMATICAL MODELING OF PESTICIDE MOVEMENT AND FAUNAL IMPACTS. ONE SEASON'S SAMPLES FROM THE ANTECEDENT GRANT HAVE BEEN ANALYZED TO DETERMINE RAIN-INDUCED VERTICAL MOVEMENT OF PESTICIDE, BUT NO RUNOFF WAS OBTAINED THAT YEAR. A SECOND YEAR'S SAMPLES ARE BEING COLLECTED IN SUMMER, 1977, AND WILL BE ANALYZED TO PROVIDE THE MISSING PARAMETERIZATION DATA. AIRBORNE LOSSES WILL ALSO BE MEASURED IN 1978. COMPUTER PROGRAMS FOR DIRECT MODEL PARAMETERIZATION FROM RAW FIELD DATA ARE BEING DEVELOPED. LABORATORY DATA ARE BEING USED TO AID IN DEVELOPMENT OF ORGANISM SUBMODELS. FIRST VALIDATION WILL BE ATTEMPTED USING 1978 FIELD DATA.

II-588

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POSSIBLE SUBLETHAL EFFECT OF PETROLEUM HYDROCARBONS ON THE PHYSIOLOGY OF
 TEMPERATURE ACCLIMATION IN MARINE FISHES (ABBREV)
   START/ COMPL DATE :    10/77 - 09/79 : FUNDING : EST. - FY   77  / $   74000
    TASK/EPA CODE :M625A-038     / R805625-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R M  BRICE
   INVESTIGATORS :    R S CALDWELL                       OREGON STATE HIGHER EDUC. SYS
                      E M CALDERONE                      OREGON STATE HIGHER EDUC. SYS
   MILE: 08/79 -FINAL REPORT
     THE PROPOSED RESEARCH WILL TEST THE HYPOTHESIS THAT PETROLEUM HYDROCARBON
     COMPOUNDS CAPABLE OF INDUCING MICROSOMAL MIXED FUNCTION OXIDASES IN
     FISH TISSUES INTERFERE WITH NORMAL PATTERNS OF FATTY ACID METABOLISM, SPE
     CIFICALLY MICROSOMAL FATTY ACID DESATURATION, AND THAT SUCH EFFECTS RESULT
     IN MODIFIED FATTY ACID PATTERNS IN MEMBRANE PHOSPHOLIPIDS OF FISH AND
     SUBOPTIMAL PHYSIOLOGICAL RESPONSES TO TEMPERATURE. TWO APPROACHES
     WILL BE TAKEN. IN ONE, FISH WILL BE EXPOSED TO PETROLEUM HYDROCARBONS FOR
     ONE TO TWO WEEKS AT AN INTERMEDIATE TEMPERATURE. FOLLOWING THIS, TREATED
     AND CONTROL FISH WILL BE COMPARED WITH RESPECT TO MICROSOMAL
     CYTOCHROME P450 AND B5 LEVELS, MIXED FUNCTION OXIDASE AND FATTY ACID
     DESATURASE ACTIVITIES, FATTY ACID COMPOSITION OF MEMBRANE PHOSPH
     OLIPIDS, AND SEVERAL BIOPHYSICAL CHARACTERISTICS OF MEMBRANES. IN A SECOND
     APPROACH, FISH WILL BE ACCLIMATED TO EXTREME TEMPERATURES, BOTH IN THE
     PRESENCE AND ABSENCE OF PETROLEUM HYDROCARBONS, AND COMPARED WITH RES
     PECT TO ABILITY TO CARRY OUT KNOWN BIOCHEMICAL AND PHYSIOLOGICAL ADAPTIONS
      TO TEMPERATURE (E.G. TEMPERATURE MEDIATED ADJUSTMENT OF MEMBRANE FATTY
     ACID COMPOSITION AND THE BIOCHEMICAL AND PHYSIOLOGICAL ADAPTIONS RESULTING
      FROM SUCH FATTY ACID CHANGES).
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EFFECT OF PETROLEUM HYDROCARBONS ON FATTY ACID METABOLISM IN MARINE
FISHES (ABBREV)
   START/ COMPL DATE :    10/77 - 09/79 : FUNDING : EST. - FY   77  / $   10757
    TASK/EPA CODE :M627 -109    / R805623-01  (GRANT)  PRIOR  FY   /           1
   PROJECT OFFICER : R M  BRICE
   INVESTIGATORS :   R S CALDWELL                        OREGON STATE HIGHER EDUC, SYS
                     E M CALDERONE                       OREGON STATE HIGHER EDUC, SYS
   MILE: 09/79 -FINAL REPORT
    THIS IS ONE OF A MULTI-PART PROJECT WHOSE SUMMARY MAY BE IDENTICAL TO
    OTHERS. THE PROPOSED RESEARCH WILL TEST THE HYPOTHESIS THAT PETROLEUM HYDR
    OCARBON COMPOUNDS CAPABLE OF INDUCING MICROSOMAL MIXED FUNCTION OXIDASE IN
    FISH TISSUE INTERFERE WITH NORMAL PATTERNS OF FATTY ACID METABOLISM,
     SPECIFICALLY MICROSOMAL FATTY ACID DESATURATION, AND THAT SUCH E
    FFECTS RESULT IN MODIFIED FATTY ACID PATTERNS IN MEMBRANE PHOSPHOLIPIDS OF
    FISH AND SUBOPTIMAL PHYSIOLOGICAL RESPONSES TO TEMPERATURE.
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II-590

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APPLICATION OF FIREFLY LUCIFERASE BACTERIAL ATP ASSAY TO MEASURE
EFFICIENCY OF WATER SUPPLY TREATMENT
   START/ COMPL DATE :    09/77 - 09/79 : FUNDING : EST. - FY   77  / $   59000
    TASK/EPA CODE :U622B-06      / R805627-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : D J  REASONER
   INVESTIGATORS :    H   OKREND                     HOWARD UNIVERSITY
                    M M VARMA                        HOWARD UNIVERSITY
   MILE: 08/78 -AUTOMATED BACTERIAL DETECTION SYSTEM
         03/79 -EVALUATION OF DETECTION SYSTEM WITH REAL SAMPLES
         08/75 -FINAL REPORT
     THE OBJECTIVES OF THE PROPOSED RESEARCH ARE TO DEVELOP A RAPID AND
     ACCURATE ASSAY OF BACTERIAL BIOMASS IN THE EFFLUENT OF POTABLE WATER TR
     EATMENT PLANTS BY FIREFLY LUCIFERASE ASSAY FOR ATP. THIS WILL ENABLE PLANT
     OPERATORS TO CHECK THE EFFICACY OF FINAL DISINFECTION OF THEIR EFFLUENT. A
      SEMI-AUTOMATED FLOW PROCESS WILL BE DEVELOPED WHICH WILL MIX SAMPLES
     WITH CHEMICAL EXTRACTANTS AND THEN WITH THE FIREFLY LUCIFERASE ENZYME IN
     FRONT OF A PHOTOMULTIPLIER TUBE WHICH WILL RECORD THE AMOUNT OF LIGHT
     EMITTED IN THE REACTION; THE AMOUNT OF LIGHT PRODUCED WILL BE PROPORTIONAL
     TO THE NUMBER OF BACTERIA PRESENT IN THE SAMPLE. THE FLOW SYSTEM CONS
     ISTS OF PERISTALTIC PUMPS, A MIXING CHAMBER AND A PHOTOMETER. IN ADDITION,
     SOME FORM OF CONCENTRATION SYSTEM, SUCH AS A FILTER, MAY BE NECESSARY TO
     INCREASE THE NUMBER OF MICROORGANISMS PRESENT IN A SAMPLE TO DETECTABLE
     LEVELS OF THE LUCIFERASE ASSAY. THE FLOW SYSTEM HAS BEEN TESTED USING
     AXENIC CULTURES OF AQUATIC MICROORGANISMS AND HAS BEEN ABLE TO DETECT
     APPROXIMATELY 5 X 10 TO THE 5TH POWER BACTERIA PER ML.
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II-591

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ENVIRONMENTAL CHANGES & AGRICULTURAL BENEFITS RESULTING FROM UTILIZATION
 OF MUNICIPAL SEWAGE SLUDGE IN THE PRODUCTION OF CROPS (ABBRE
   START/ COMPL DATE :    10/77 - 10/80 : FUNDING : EST. - FY   77  / $  150000
    TASK/EPA CODE :C611B-7219    / R805629-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : G K  DOTSON
   INVESTIGATORS :    C L HING                       METROP. SAN. DIST. OF CHICAGO
                      D   ZENY                       METROP. SAN. DIST. OF CHICAGO
                      J R PETERSON                   METROP. SAN. DIST. OF CHICAGO
                      R I PIETZ                      METROP. SAN. DIST. OF CHICAGO
   MILE: 09/77 -GRANT AWARD
         09/80 -PROJECT COMPLETED
         02/81 -FINAL REPORT PUBLISHED
    OBJECTIVE: THE GENERAL OBJECTIVES ARE TO COLLECT INFORMATION NEEDED TO
    DEVELOP METHODS FOR PREVENTING OR MINIMIZING ADVERSE EFFECTS ON
    SOILS, CROPS, WATER, AND ANIMALS, AND MAXIMIZING BENEFITS FROM USING
    SEWAGE SLUDGE AS A FERTILIZER AND SOIL CONDITIONER. APPROACH: FIELD PLOTS
    AND LYSIMETER PLOTS WITH THREE SOIL TYPES AND STRIP-MINED SOIL WILL
    RECEIVE LIQUID DIGESTED SLUDGE APPLICATIONS AT VARYING RATES (0, 1/4, 1/2
    AND MAXIMUM). SOME PLOTS HAVE RECEIVED ANNUAL SLUDGE APPLICATIONS FOR
    NINE (9) YEARS. MAXIMUM RATE IS EQUIVALENT TO ONE INCH PER WEEK FOR ABOUT
    SIX TO NINE WEEKS. THE EFFECT OF SLUDGE COMPONENTS ON SOIL, WATER AND
    CROPS WILL BE DETERMINED BY REGULAR SAMPLING AND ANALYSIS. CORN AND SOY
    BEANS PRODUCED ON SLUDGE TREATED SOILS WILL BE FED TO LAYING HENS. THE EFF
    ECT ON THE HEALTH, COMPOSITION AND PRODUCTION OF THE HENS WILL BE MEASURED
     OVER A PERIOD OF 80 WEEKS. CADMIUM ACCUMULATION IN THE HENS AND EGGS
     WILL BE DETERMINED. A SINGLE APPLICATION OF DEWATERED SLUDGE AT
    HIGH RATE ON FIELD PLOTS ON STRIP-MINED SOILS WILL BE COMPARED TO
    INCREMENTAL LIQUID SLUDGE APPLICATIONS ANNUALLY.
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REDUCTION OF POLLUTANTS IN MUNICIPAL SEWAGE SLUDGE TO LEVELS CONSISTENT
WITH LAND DISPOSAL
   START/ COMPL DATE :    10/77 - 03/79 : FUNDING : EST. - FY   77  / $  136792
    TASK/EPA CODE :C611B-7217   / R805631-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : S A  HANNAH
   INVESTIGATORS :    K J YOST                      PURDUE UNIVERSITY
                      R F WUKASCH                   PURDUE UNIVERSITY
   MILE: 10/77 -PROJECT START
         10/78 -COMPLETE DATA COLLECTION AND ANALYSIS
         03/79 -COMPLETE REPORT
     OBJECTIVES - THE PROJECT INVOLVES ESTABLISHING A PROTOCOL TO ASSIST C
     OMMUNITIES IN IDENTIFYING, QUANTIFYING AND FORMULATING REGULATORY POLICIES
      RELATIVE TO THE REDUCTION OF METALS AND CYANIDES TO MUNICIPAL TREATMENT
     PLANTS TO THE POINT THAT LAND DISPOSAL OF DIGESTOR SLUDGE IS FEASIBLE. M
     ETALS OF INTEREST INCLUDE CU, NI, CRT, CR ION, CD, ZN, HG AND PB. THE TERM
     "CYANIDES" DENOTES TOTAL CYANIDE AS WELL AS CYANIDE AMENABLE TO
     CHLORINATION. APPROACH - WASTEWATERS FROM RESIDENTIAL NEIGHBORHOODS,
     INDUSTRIAL DISCHARGES, MIXED MUNICIPAL WASTEWATERS AND TREATMENT PLANT
     INFLUENTS, EFFLUENTS AND SLUDGES WILL BE SAMPLED AND ANALYZED TO PERMIT
     CALCULATION OF RELATIVE SOURCES OF METALS IN MUNICIPAL WASTEWATERS AND SLU
     DGES IN KOKOMO, IND. POTENTIAL STORMWATER CONTRIBUTIONS WILL BE CALCULATED
      FROM ANALYSES OF DUSTFALL OVER THE COLLECTION AREA AND WILL BE INCLUDED
     IN THE ANALYSIS. OUTPUTS - A FINAL REPORT WILL ANALYZE THE SAMPLING
     RESULTS ON A LOCAL BASIS AND WILL INCLUDE A GENERAL PROTOCOL FOR S
     AMPLING AND REGULATING DISCHARGES OF METALS AT OTHER LOCATIONS. A COMPUTER
     PROGRAM TO EVALUATE ALTERNATE CONTROL STRATEGIES ON A COST-BENEFIT BASIS
     WILL ALSO BE A PRODUCT OF THE GRANT.
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USE OF A VEGETATIVE FILTER ZONE TO CONTROL FINE-GRAINED SEDIMENTS FROM
SURFACE MINES
   START/ COMPL DATE :    11/77 - 05/79 : FUNDING : EST. - FY   77  / $  119000
    TASK/EPA CODE :B6238-506    / S805632-01  (GRANT)  PRIOR  FY76 /           1
   PROJECT OFFICER : E    BATES
   INVESTIGATORS :   R E NICKEL                         HITTMAN ASSOCIATES INC.
                     B   FISH                           STATE DEPT. OF NAT. RESOURCES
                     B J BARFIELD                       UNIV. OF KENTUCKY
                     C T HAAN                           UNIV. OF KENTUCKY
   MILE: 08/77 -FUNDING PACKAGE SUBMITTED
         09/77 -AWARD FUNDS FOR PROJECT
         01/78 -PLANNING AND FEASIBILITY STUDY
         04/79 -CONSTRUCTION & DATA COLLECTION
         05/79 -FINAL REPORT
    PRIMARY OBJECTIVE OF THE PROJECT IS TO DEMONSTRATE THE TECHNICAL, THE
    ECONOMIC AND ENVIRONMENTAL FEASIBILITY OF USING A VEGETATIVE FILTER ZONE
    TO ASSIST IN CONTROLLING FINE-GRAINED SEDIMENTS ORIGINATING FROM SU
    RFACE MINING ACTIVITIES. SPECIFIC OBJECTIVES INCLUDE: (1) EXAMINE SEDIMENT
     TRAPPING EFFICIENCY OF THE FILTER ZONE, (2) EXAMINE SUITABILITY OF
    VARIOUS TYPES OF VEGETATION TO USE IN THE FILTER ZONE, (3) EVALUATE THE
    FILTER'S USEFULNESS IN IMPROVING WATER QUALITY, AND (4) DETERMINE THE
    COST FEASIBILITY OF USING THE FILTER ON SURFACE MINES IN EASTERN KENTUCKY.
    BASICALLY, THE PROJECT WILL ENTAIL THE DIVERSION OF SURFACE RUNOFF WATER,
    WHICH HAS BEEN COLLECTED AT A PARTICULAR POINT ON THE MINING SITE,
    DOWN A RIPRAP LINED CHANNEL AND THROUGH A VEGETATIVE FILTER ZONE APPRO
    XIMATELY 20 FEET WIDE AND 200 FEET LONG. IN ORDER TO ASSURE THAT RUNOFF IS
    ACCURATELY MONITORED, A BERM WILL BE CONSTRUCTED AROUND THE PROJECT S
    ITE. A FLOW DISTRIBUTION AREA AND A LEVEL SPREADER WILL BE INSTALLED BELOW
    THE RIPRAP LINED CHANNEL AND ABOVE THE FILTER ZONE. THE PROJECT WILL INCL
    UDE FOUR TASKS: (1) PLANNING AND FEASIBILITY STUDY, (2) SEDIMENT AND WATER
     QUALITY MONITORING, (3) CONSTRUCTION AND DEMONSTRATION, AND (4)
    PROJECT MANAGEMENT.
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AMMONIA TOXICITY TO FISHES

   START/ COMPL DATE :    10/77 - 09/78 : FUNDING : EST. - FY   77  / $   50000
    TASK/EPA CODE :C619A-7117   / R805636-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : W    BRUNGS
   INVESTIGATORS :    R V THURSTON                        MONTANA STATE UNIVERSITY
                      R   RUSSO                           MONTANA STATE UNIVERSITY
   MILE: 10/77 -PROJECT START
        09/78 -PROJECT COMPLETION
        03/79 -FINAL REPORT
     THE OBJECTIVE OF THIS RESEARCH IS TO DETERMINE THE EFFECT ON FISH OF
     EXPOSURES TO FLUCTUATING CONCENTRATIONS OF AMMONIA ABOVE THE PROPOSED
     EPA CRITERION LEVEL OF 0.02 MG/LITER NH3 BUT BELOW ACUTE TOXICITY LEV
     ELS. THIS WILL BE ACCOMPLISHED THROUGH A SERIES OF LABORATORY FLOW-THROUGH
      BIOASSAYS IN WHICH RAINBOW TROUT AND FATHEAD MINNOWS WILL BE EXPOSED
     TO FLUCTUATING CONCENTRATIONS OF AMMONIA. TWO DIFFERENT FLUCTUATION REGI
     MES WILL BE STUDIED: (1) DIURNAL FLUCTUATIONS TYPICAL OF THOSE WHICH MIGHT
      BE CAUSED BY WASTEWATER TREATMENT PLANT DISCHARGES, AND (2) INTERMITTENT
      FLUCTUATIONS AS MIGHT BE CAUSED BY "SLUG" DISCHARGES. EXPERIMENTS
       TO INVESTIGATE THE EFFECT OF FLUCTUATIONS UNDER STRESSFUL CONDITIONS
      OF TEMPERATURE AND DISSOLVED OXYGEN WILL ALSO BE EXAMINED IN AN
     EXPLORATORY FASHION.
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II-595

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AMMONIA TOXICITY TO FISHES

 START/ COMPL DATE :    10/77 - 09/78 : FUNDING : EST. - FY   77  / $   50000
  TASK/EPA CODE :V619 -93      / R805636-01  (GRANT)  PRIOR  FY    /         1
 PROJECT OFFICER : W    BRUNGS
 INVESTIGATORS :   R V THURSTON
                   R C RUSSO                          MONTANA STATE UNIVERSITY
MILE: 10/78 -FINAL REPORT                             MONTANA STATE UNIVERSITY
  THE OBJECTIVE OF THE PROPOSED RESEARCH IS TO DETERMINE THE EFFECT ON
 FISHES OF EXPOSURE TO FLUCTUATING AMMONIA CONCENTRATIONS ABOVE THE
 PROPOSED EPA CRITERION LEVEL OF 0.01 MG/LITER HH3(G). LABORATORY BIOASSAYS
 WILL BE CARRIED OUT EMPLOYING AMMONIA CONCENTRATION FLUCTUATION REGIMES OF
  TWO TYPES: (1) DIURNAL FLUCTUATIONS, AND (2) INTERMITTENT FLUCTUATIONS.
 THE EXPERIMENTS TO INVESTIGATE DIURNAL FLUCTUATIONS WILL INVOLVE FLUCTUA
 TIONS IN A PATTERN SIMULATING THE DIURNAL CYCLE TYPICAL OF MANY WASTEWATER
 TREATMENT PLANT DISCHARGES; I.E. PEAKS DURING MID- AND LATE-DAY, AND A LOW
 DURING THE EARLY MORNING HOURS. THE EXPERIMENTS TO DETERMINE THE EFFECT
 OF INTERMITTENT FLUCTUATIONS, SIMULATING ACCIDENTIAL DISCHARGES, WILL
  INCLUDE SUBJECTING TEST FISH FOR ONLY A FEW HOURS OR DAYS TO DOSES OF
 AMMONIA AT HIGH CONCENTRATIONS KNOWN TO BE ACUTELY TOXIC. TEST FISHES WILL
 BE RAINBOW TROUT AND FATHEAD MINNOWS. BIOLOGICAL PARAMETERS TO BE
 MEASURED INCLUDE MORTALITY/SURVIVAL, BLOOD AMMONIA CONCENTRATIONS, TISSUE
 DEGENERATION, AND FISH BEHAVIOR. BIOASSAY TEST METHODS WILL CLOSELY APPROX
 IMATE THOSE RECOMMENDED BY THE EPA COMMITTEE ON METHODS FOR TOXICITY TESTS
 WITH AQUATIC ORGANISMS.
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EVALUATION OF NATURAL INHIBITING FACTORS IN AN AGGRESSIVE DRINKING WATER
 SUPPLY
   START/ COMPL DATE :    10/77 - 02/79 : FUNDING : EST. = FY   77  / $   31386
    TASK/EPA CODE :C614A-7137   / R805638-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : R W  BUELOW
   INVESTIGATORS :    D T ZAJICEK                     UNIV. OF MASSACHUSETTS
                      E   LAMOTTA                     UNIV. OF MASSACHUSETTS
   MILE: 10/77 -PROJECT STARTED
         02/78 -COMPLETE WATER PRESSURE SURVEYS
         08/78 -COMPLETE LABORATORY TESTING WATER QUALITY COMBINATIONS
         02/79 -PROJECT COMPLETED - FINAL REPORT
    OBJECTIVE: TO FIND OUT WHY AMHERST, MASS. WATER IS NOT SEVERELY CORROSIVE
    TO DISTRIBUTION SYSTEM PIPE MATERIALS WHEN IT TESTS CHEMICALLY TO BE A
     HIGHLY AGGRESSIVE WATER. APPROACH: ANALYZE AMHERST'S WATER CHEMI
    CALLY AND COMPARE IT TO OTHER KNOWN AGGRESSIVE WATERS THAT CAUSE CORROSION
     PROBLEMS. ALSO, ADD SUBSTANCES TO AMHERST WATER TO DETERMINE WHAT
    WILL MAKE IT CORROSIVE. PROGRESS: GRANT APPLICATION IS BEING PROCESSED.
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LEVEL 1 PILOT STUDY ON PROCESS AND WASTE STREAMS AND FUGITIVE EMISSIONS FROM NONFERROUS METAL SMELTER

START/ COMPL DATE : 08/77 - 12/78 : FUNDING : EST. - FY 77 / $ 23000
TASK/EPA CODE :B610B-641 / R805644-01 (GRANT) PRIOR FY77 / $ 233091
PROJECT OFFICER : G THOMPSON
INVESTIGATORS : T E CODY UNIV. OF CINCINNATI
K WILLEKE UNIV. OF CINCINNATI
V J ELIA UNIV. OF CINCINNATI
R T CHRISTIAN UNIV. OF CINCINNATI

THE USE OF BIOASSAYS IN COMBINATION WITH CHEMICAL ANALYSIS SHOULD BE AN EFFECTIVE APPROACH FOR EVALUATING THE IMPACT OF INDUSTRIAL EFFLUENTS ON THE ENVIRONMENT AND HUMAN HEALTH. THE INDUSTRIAL ENVIRONMENTAL RESEARCH LABORATORY OF USEPA HAS PREPARED A MANUAL OF PROCEDURES FOR CARRYING OUT A SERIES OF BIOASSAYS TO SCREEN INDUSTRIAL EFFLUENTS. THE OBJECTIVE OF THIS PROPOSAL IS TO PERFORM THESE BIOASSAYS AND EVALUATE THEIR EFFECTIVENESS AT NONFERROUS METAL SMELTERS UNDER ACTUAL FIELD CONDITIONS. THE WORK IS SEGMENTED INTO THREE PHASES. PHASE I IS A DEVELOPMENT AND PLANNING PHASE DURING WHICH PREPARATIONS ARE MADE FOR SAMPLING, CHEMICAL ANALYSIS, AND BIOASSAYS. PHASE II IS THE SAMPLING AND ANALYSIS PHASE. DURING PHASE III THE DATA AND PROTOCOLS WILL BE EVALUATED IN TERMS OF FEASIBILITY OF USING THE BIOASSAYS IN THE SMELTER INDUSTRY. RECOMMENDATIONS FOR MODIFICATIONS IN THE PROGRAM INCLUDING USE OF ALTERNATIVE BIOASSAYS WILL BE INCLUDED IN THE EVALUATION REPORT.

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EXPOSURE ASSESSMENTS - STATE-OF-THE-ART REVIEW

   START/ COMPL DATE :    10/77 - 03/78 : FUNDING : EST. - FY   77  / $   13804
    TASK/EPA CODE :K609A-444    / R805647-01  (GRANT)  PRIOR  FY   /         1
   PROJECT OFFICER : J W  FALCO
   INVESTIGATORS :   R    ZECKHAUSER                  HARVARD UNIVERSITY
                     C    MILLER                      HARVARD UNIVERSITY
   MILE: 10/77 -START PROJECT
         04/78 -FINAL REPORT - SUMMARIZING RESULTS OF PROJECT
    THE OBJECTIVES OF THIS GRANT ARE TO EVALUATE THE STATE-OF-THE-ART OF
    MATHEMATICAL MODELS FOR APPLICATION TO ASSESSING TOXIC SUBSTANCES EX
    POSURE AND TO RECOMMEND RESEARCH NEEDS IN THIS AREA. THE STUDY WILL BE DIR
    ECTED TOWARD THE USE OF MULTIMEDIA MODELS THAT CAN PREDICT INTERPHASE TRAN
    SFER AMONG AIR, LAND, AND WATER ENVIRONMENTS. THE OBJECTIVES OF THIS STUDY
     WILL BE ACCOMPLISHED BY CARRYING OUT A LITERATURE SURVEY AND CO
    NDUCTING SITE VISITS TO RESEARCH INSTITUTIONS INVOLVED IN RESEARCH PERTAIN
    ING TO TOXIC SUBSTANCE EXPOSURE ANALYSIS. A REPORT SUMMARIZING THE RESULTS
    OF THE STUDY WILL BE PUBLISHED UPON COMPLETION OF THE PROJECT. THE REPO
    RT WILL CONTAIN RECOMMENDATIONS FOR FUTURE RESEARCH IN MULTIMEDIA MODELING
    NEEDED FOR TOXIC SUBSTANCE EXPOSURE ASSESSMENT.
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II-599

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NOVEL TECHNIQUES FOR CONCENTRATION AND SEPARATION OF TOXIC SUBSTANCES
FROM ESTUARINE WATERS
   START/ COMPL DATE :    09/77 - 09/79 : FUNDING : EST. - FY   77  / $   49816
    TASK/EPA CODE :W608C-1-05   / R805656-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : N L  RICHARDS
   INVESTIGATORS :   E   KLEIN                     GULF SOUTH RESEARCH INSTITUTE
   MILE: 10/78 -REPORT ON METHODOLOGY EVALUATION
     THE OBJECTIVE IS TO DEVELOP METHODS FOR THE SEPARATION, CONCENTRATION AND
     IDENTIFICATION OF XENOBIOTICS WITH MUTAGENIC/CARCINOGENIC
     PROPERTIES FROM THE ESTUARINE ENVIRONMENT.
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ALASKA VILLAGE DEMONSTRATION PROJECT--EMMONAK

   START/ COMPL DATE :    10/77 - 09/78 : FUNDING : EST. - FY   77  / $   30000
    TASK/EPA CODE :M611B-40      / R805660-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : H    COUTTS
   INVESTIGATORS :   D   REDFOX                      EMMONAK CITY GOVERNMENT
   MILE: 09/78 -FINAL REPORT
     THE OBJECTIVE IS TO PROVIDE FOR TECHNICAL ASSISTANCE AND OPERATION AND
     MAINTENANCE SUPPORT TO A SMALL NATIVE COMMUNITY FOR THE OPERATION OF A
     CENTRAL UTILITY TYPE FACILITY (INCLUDING WATER SUPPLY AND WASTE TREATMENT
     SYSTEMS) FOR EVALUATION OF ENGINEERING PERFORMANCE AND INSTITUTIONAL
      MANAGEMENT.
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ALASKA VILLAGE DEMONSTRATION PROJECT--WAINWRIGHT

   START/ COMPL DATE :    10/77 - 09/78 : FUNDING : EST. - FY   77  / $   52300
    TASK/EPA CODE :M611B-41      / R805661-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : H    COUTTS
   INVESTIGATORS :   D   BODFISH
   MILE: 09/78 -FINAL REPORT                         WAINWRIGHT CITY GOVERNMENT
     THE OBJECTIVE IS TO PROVIDE FOR TECHNICAL ASSISTANCE AND OPERATION AND
     MAINTENANCE SUPPORT TO A SMALL NATIVE COMMUNITY FOR THE OPERATION OF A
     CENTRAL UTILITY TYPE FACILITY (INCLUDING WATER SUPPLY AND WASTE TREATMENT
     SYSTEMS) FOR EVALUATION OF ENGINEERING PERFORMANCE AND INSTITUTIONAL
      MANAGEMENT.
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IV-602

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POLISHING OF INDUSTRIAL WASTE STREAM EFFLUENTS USING FLY ASH-CLAY
ABSORBENT
   START/ COMPL DATE :    08/77 - 09/78 : FUNDING : EST. - FY   77  / $   40000
    TASK/EPA CODE :86108-464    / R805666-01  (GRANT)  PRIOR  FY76 /          1
   PROJECT OFFICER : M K  STINSON
   INVESTIGATORS :   J W LISKOWITZ                 NEW JERSEY INST. OF TECHNOLOG
                     P   CHAN                      NEW JERSEY INST. OF TECHNOLOG
                     R B TRATTNER                  NEW JERSEY INST. OF TECHNOLOG
                     M S SHEIH                     NEW JERSEY INST. OF TECHNOLOG
   MILE: 08/77 -FUNDING PACKAGE SUBMITTED
         08/77 -AWARD FUNDS FOR PROJECT
         02/78 -PROGRESS REPORT
         05/78 -PROGRESS REPORT
         08/78 -PROGRESS REPORT
         09/78 -DRAFT FINAL REPORT
         10/78 -FINAL REPORT RECEIVED
    THE OBJECTIVE OF THIS PROPOSED INVESTIGATION IS TO ESTABLISH THE FEA
    SIBILITY OF USING INEXPENSIVE FLY ASH AND CLAY COMBINATIONS (ILLITE, VERMI
    CULITE, KAOLINITE, AND NATURAL ZEOLITE) FOR POLISHING INDUSTRIAL WASTE STR
    EAM EFFLUENTS SUCH AS FELSPAR MINING AND PROCESSING. THESE SORBENT COMBINA
    TIONS WERE PROVEN IN OUR STUDIES TO BE EXTREMELY EFFECTIVE FOR TREATING HE
    AVY METALS, ORGANICS, AND TOXIC ANIONS IN INDUSTRIAL SLUDGE LEACHATES. FOR
    EXAMPLE, FLUORIDE CONCENTRATIONS RANGING FROM 7 TO 155 PPM ENCOUNTERED
    IN CALCIUM FLUORIDE SLUDGE LEACHATE WERE REDUCED TO LESS THAN 1 PPM, USING
    THE ABOVE MENTIONED INEXPENSIVE COMBINATIONS. THE PROPOSED ONE-YEAR
    STUDY IS DIVIDED INTO TWO PHASES, NAMELY, ANALYTICAL AND LYSIMETER
    STUDIES. THE ANALYTICAL STUDY PHASE WILL INVOLVE THE IDENTIFICATIO
    N AND CONCENTRATION MEASUREMENT OF THE HEAVY METALS, TOXIC ANIONS AND ORGA
    NICS PRESENT IN THE WASTE STREAM EFFLUENT. ONCE THE PROMISING COMBINATIONS
     HAVE BEEN SELECTED, THE PHASE OF LYSIMETER STUDY WILL BE CARRIED OUT
     TO ALLOW US TO DEFINE SORBENT COMBINATIONS THAT WILL PROVIDE OPTIMUM
    REDUCTION.
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CONSEQUENCES OF CRUDE OIL CONTAMINATION ON COLD CLIMATE SALT MARSHES AND
INSHORE ECOSYSTEMS - PHASE I - FIELD SITE RECONNAISSANCE
START/ COMPL DATE :   10/77 - 09/78 : FUNDING : EST. - FY   77 / $ 34966
TASK/EPA CODE :M608C-042   / R805668-01 (GRANT) PRIOR FY   /   1
PROJECT OFFICER : R   MCFADDEN
INVESTIGATORS :   C P MCROY
MILE: 09/78 -FINAL REPORT   UNIV. OF ALASKA

THE GENERAL OBJECTIVE OF THIS RESEARCH IS TO SELECT CRUCIAL FIELD SITES FOR THE STUDY OF THE CONSEQUENCES OF CRUDE OIL CONTAMINATION ON SALT MARSHES AND RELATED ECOSYSTEMS IN ALASKAN WATERS. RESEARCH WILL INCLUDE A PRELIMINARY ANALYSIS OF THE PLANT AND ANIMAL COMMUNITY STRUCTURE, CYCLING OF NUTRIENTS AND PRIMARY PRODUCTIVITY. THE RESULTS WILL BE USED AS THE BASIS FOR DESIGNING AN EXTENSIVE RESEARCH PROJECT TO STUDY THE EFFECTS OF CRUDE OIL CONTAMINATION ON MARSHES.

II-604

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INVESTIGATION OF ENZYMATIC SCREENING TESTS FOR MUTAGENS IN ENVIRONMENTAL
 POLLUTANTS
   START/ COMPL DATE :    09/77 - 09/78 : FUNDING : EST. - FY   77  / $   40000
    TASK/EPA CODE :Q608C-1-06   / R805671-01  (GRANT)  PRIOR  FY   /          1
   PROJECT OFFICER : N L  RICHARDS
   INVESTIGATORS :   J   SCHMIDTCULLER                UNIV. OF DENVER
   MILE: 10/78 -PRELIMINARY EVALUATION OF SCREENING METHOD
         01/79 -REPORT ON VALIDATION OF SCREENING METHOD
     THE OBJECTIVE OF THIS RESEARCH IS TO STUDY THE FEASIBILITY OF THE IN VITRO
      ACTIVATION OF MICROSOMAL DRUG-METABOLIZING ENZYME SYSTEMS FOR THE DEVELO
     PMENT OF A RAPID AND SENSITIVE PRESCREENING TEST FOR MUTAGENICITY OF SYNFU
     EL RELATED ENVIRONMENTAL POLLUTANTS, THEIR DERIVATIVES AND THEIR METABOLIC
      PRODUCTS AS THEY MAY OCCUR ON LAND AND IN AQUATIC AND MARINE
     ENVIRONMENTS.
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II-605

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TECHNICAL STUDIES OF COOK INLET COASTAL WETLANDS

   START/ COMPL DATE :    10/77 - 10/78 : FUNDING : EST. - FY   77  / $   50220
    TASK/EPA CODE :M608C-043     / R805690-01  (GRANT)  PRIOR  FY    /        1
   PROJECT OFFICER : H V  KIBBY
   INVESTIGATORS :    K   MACDONALD                        UNIV. OF IDAHO
                      F   RABE                             UNIV. OF IDAHO
   MILE: 09/78 -FINAL REPORT
     THE OBJECTIVE UF THIS PROJECT IS TO PROVIDE QUANTITATIVE DATA ON THE PRI
     MARY PRODUCTION OF A MAJOR COASTAL WETLAND SITE WITHIN COOK INLET, ALASKA,
      AND TO IDENTIFY AND ASSESS THE FUNCTIONAL INTERRELATIONSHIPS AM
     ONG WETLANDS, THE ADJACENT TERRESTRIAL ECOSYSTEM AND THE ESTUARINE ECOSYST
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II - 606

(a) To construct two earthen sediment dams where Cane Creek and the other unnamed tributary enter the lake, and
(b) to dredge material from existing sediment deposits in the lake, and
(c) to use spoil, rip rap, and spillways to provide two sediment traps that will protect the lake from continuing sedimentation

HEALTH IMPLICATIONS OF COAL RELATED ENERGY DEVELOPMENT - MINING IMPACTS

START/ COMPL DATE : 01/78 - 00/80 : FUNDING : EST. - FY 77 / $ 114279
TASK/EPA CODE :D625 -008 / R805700-01 (GRANT) PRIOR FY76 / 1
PROJECT OFFICER : W GRUBIE

INVESTIGATORS :

M A BELL	BATTELLE MEMORIAL INSTITUTE
D A SAVITZ	BATTELLE MEMORIAL INSTITUTE
V Q HALE	BATTELLE MEMORIAL INSTITUTE
M C MATTHEWS	BATTELLE MEMORIAL INSTITUTE
R A EWING	BATTELLE MEMORIAL INSTITUTE
R W COTE	BATTELLE MEMORIAL INSTITUTE
M D KELLER	OHIO STATE UNIVERSITY
N A REICHES	BATTELLE MEMORIAL INSTITUTE

MILE: 12/78 -PROGRESS REVIEW
12/79 -FINAL REPORT

IN ANALYZING THE CURRENT AND FUTURE ENERGY STATUS OF THE UNITED STATES, IT IS CLEAR THAT THE INCREASED DEVELOPMENT OF COAL MINING MUST BE AN INTEGRAL PART OF THE LONG-TERM PLANS. WESTERN COAL REGIONS ARE EXPECTED TO SUPPLY A GREAT DEAL OF THE COUNTRY'S NEEDS. THE PURPOSE OF THE PROPOSED RESEARCH IS TO ESTABLISH A METHOD FOR PROSPECTIVE EPIDEMIOLOGIC ANALYSIS OF THE HEALTH EFFECTS ASSOCIATED WITH THE DEVELOPMENT OF WESTERN COAL SITES. TWO ASPECTS OF ENERGY DEVELOPMENT WILL BE CONSIDERED IN EVALUATING HEALTH OUTCOMES: THE INDUSTRIAL ACTIVITY PER SE AND THE EFFECT OF THE UNPLANNED GROWTH WHICH OCCURS AS A RESULT OF RAPID ECONOMIC DEVELOPMENT. THE EMPHASIS IN THIS RESEARCH PROGRAM WILL BE ON THE FORMER, SPECIFICALLY FOCUSING ON WATER POLLUTANT ASPECTS OF MINING ACTIVITY. A LIST OF COAL-DEVELOPMENT IMPACTED COMMUNITIES IN THE WESTERN COAL MINING AREA HAS BEEN PREPARED. AFTER SELECTING A FEW SITES FROM THAT LIST FOR ANALYSIS, AVAILABLE INFORMATION ON THE POPULATION'S HEALTH STATUS AND ENVIRONMENTAL QUALITY WILL BE COMPILED, INCLUDING COMMUNITY AND ENVIRONMENTAL HEALTH SERVICES. THIS INFORMATION WILL BE EVALUATED USING THE CRITERIA OF ITS ADEQUACY AS A BASIS FOR PROSPECTIVE EPIDEMIOLOGIC RESEARCH. IT SHOULD BE NOTED THAT THE INFORMATION DERIVED FROM THIS RESEARCH WILL BE DESCRIPTIVE IN NATURE. NO STATEMENTS REGARDING CURRENT CAUSE-EFFECT RELATIONSHIPS CAN BE MADE; HOWEVER, THE BASIS WILL BE PROVIDED FOR FUTURE QUANTITATIVE ANALYTICAL STUDIES.